Lower Meadow Creek Tailings Removal

Final TCRA Work Plan

pursuant to

Administrative Settlement and Order on Consent for Removal Actions

(CERCLA Docket No. 10-2021-0034)

Prepared by

Perpetua Resources

With revisions regarding selected design alternatives by:

U.S. Environmental Protection Agency Region 10

United States Department of Agriculture Forest Service Intermountain Region

Stibnite Mine Site

Stibnite, Valley County, ID

July 2021

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ABBREVIATION	DESCRIPTION
%	Percent
AMSL	Above mean sea level
ARAR	Applicable and Relevant or Appropriate Requirement
ASAOC	Administrative Settlement Agreement and Order on Consent
BMPs	Best management practices
BPA	Bonneville Power Administration
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Chemical of concern
CY	Cubic yards
District	Stibnite-Yellow Pine Mining District
ECO	Engineering Change Order
EE/CA	Engineering Evaluation and Cost Analysis
EFSFSR	East Fork of the South Fork Salmon River
EPA	U.S. Environmental Protection Agency
EPP	Environmental Protection Plan
ESA	Endangered Species Act
IDEQ	Idaho department of Environmental Quality
LMCV	Lower Meadow Creek Valley
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
MSE	Millennium Science and Engineering, Inc.
MWMP	Meteoric Water Mobility Test Procedure
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NTCRA	Non-time Critical Removal Action
OSC	On-Scene Coordinator
Perpetua	Respondents Perpetua Resources Corp., Perpetua Resources Idaho, Inc. (formerly Midas Gold Corp. and Midas Gold Idaho, Inc. respectively), Idaho Gold Resources Company, LLC and Stibnite Gold Company
QAPP	Quality Assurance Project Plan
RAO	Removal action objective

Rio ASE	Rio Applied Science and Engineering
SGP	Stibnite Gold Project
SODA	Spent ore disposal area
SOW	Statement of Work
TCRA	Time Critical Removal Action
USDA-FS	U.S. Department of Agriculture Forest Service
USGS	U.S. Geological Survey

1 EXECUTIVE SUMMARY

This Removal Action Work Plan has been prepared for the implementation of a Time Critical Removal Action (TCRA) for the Lower Meadow Creek Valley (LMCV) area of the Stibnite Mine (Project Area or Site) in Valley County, Idaho. Perpetua Respondents are implementing the TCRA in accordance with the requirements of an Administrative Settlement Agreement and Order on Consent (ASAOC) for Removal Actions with U.S. Environmental Protection Agency (EPA) and U.S. Department of Agriculture Forest Service (USDA-FS or Forest Service) (EPA and USDA-FS, 2021a). The work is being conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The purpose of this Work Plan is to present the selected design alternative for the TCRA that best satisfies the criteria and removal action objectives (RAOs) used to evaluate the potential design alternatives presented in the Revised Lower Meadow Creek Removal Action Revised Work Plan (Perpetua, 2021).

Historical operations within the Stibnite Mining District resulted in the placement and deposition of tailings and mine waste within the floodplain of lower Meadow Creek and the East Fork of the South Fork Salmon River (EFSFSR). Surface water quality data from the lower reach of Meadow Creek and from the EFSFSR below its confluence with Meadow Creek have consistently shown elevated arsenic and antimony concentrations that exceed Idaho's chronic aquatic life water quality standards.

The primary goal of the TCRA is to reduce the uncontrolled release of metals to surface water in Meadow Creek and the EFSFSR through the removal of tailings and mine waste. Waste materials removed will be placed in the southeast portion of the repository to be constructed on the former Canadian Superior Mining heap leach pads, the design of which is discussed in the Bradley Man Camps Dump TCRA Work Plan. The RAOs for this project are:

- Reduce transport of Chemicals of Concern (COCs) that contribute to unacceptable ecological risks from mine waste, contaminated soil, and contaminated sediment into surface water, sediment, and groundwater.

- Protect surface water and sediment quality in Lower Meadow Creek and the EFSFSR by consolidating mine waste material, tailings, and impacted soil/sediment in an on-site repository that is a permanent disposal location for the waste materials that eliminates migration of hazardous constituents to the environment.

- Reconstruct stream channels to restore aquatic and riparian habitat.

Stream restoration design criteria, including proposed channel geometries were developed for each reach based on multiple lines of evidence derived from field studies of reference sites (developed for Stibnite Gold Project stream restoration planning); empirical formulae developed from local and regional data; and published design guidelines available in the scientific literature. The reach-specific design criteria were then applied to each design alternative to develop a conceptual meander plan and profile, and representative cross sections. From these plans, earthwork quantities were calculated for each design alternative. Typical bank treatments and in-channel features were identified, and their design will be developed to provide habitat diversity and facilitate bank stabilization until riparian vegetation becomes established. Finally, a generalized revegetation and planting plan was developed for specific riparian, wetland, and upland zones to improve long-term bank stability, woody debris recruitment, overhead cover, shade, and terrestrial/wetland habitat.

The principal uncertainties for design of the removal action concern the physical distribution of tailings and mine waste materials in the removal area and the specific causes of surface water quality degradation observed in the stream reach. Perpetua identified several data gaps that will be filled to support preparation of final engineering designs. These data deficiencies include the following:

- Characterize and differentiate tailings and mine impacted sediments from non-impacted alluvial sediments.
- Establish performance standards for source material removal, including physical and chemical characteristics.
- Understand the engineering characteristics of waste materials.

After selection of a design alternative, the conceptual design will be advanced through multiple iterations of increasing refinement to develop a construction plan that will meet key restoration objectives including:

- Restore the disturbed channel, banks and floodplain resulting from mine waste removal.
- Restore natural channel processes to maintain diverse habitat to the extent practical.
- Increase in-stream hydraulic diversity for improved aquatic habitat.
- Increase pool frequency and complexity.
- Increase floodplain connectivity (frequency, duration, and area of floodplain inundation).
- Increase in-channel structure and improve aquatic habitat by incorporating large woody debris structures.
- Create a robust riparian corridor by planting and seeding of native species.

The key restoration objectives will guide the help the removal action meet the removal action objective of reconstructing stream channels in a manner that restores aquatic and riparian habitat.

Two potential design alternatives were developed by Perpetua in the Revised Lower Meadow Creek Tailings Removal TCRA Work Plan (2021) targeting removal of tailings from the banks and floodplain; these two design alternatives are summarized below. Design alternative T2 was selected by the EPA. A more detailed description of the selected design alternative and the rationale for selection is provided in Section 7.

Design Alternative T1 – Lower Meadow Creek. Design Alternative T1 includes removal of tailings, mine waste, and contaminated, commingled, or overlying native material within an approximately 120-foot-wide floodplain corridor along Meadow Creek beginning at the downstream extent of the previously restored Meadow Creek reach and ending approximately 200 feet upstream of the confluence with the EFSFSR. This alternative targets tailings material on the southeastern bank of Meadow Creek in the area referred to as the Meadow Creek Wetland and is estimated to remove 5,000 cubic yards (CY) of tailings materials and 18,000 CY of contaminated or commingled alluvial materials. Mine waste and native material will be removed down to the proposed floodplain elevation (approximately 2 feet above the existing channel invert elevation). If tailings extend below the proposed floodplain elevation, tailings will be over-excavated and backfilled with clean native material to match the proposed grade.

Design Alternative T2 – Tailings Ponds. Design Alternative T2 targets tailings materials in the former tailings ponds, which were not removed in the previous Meadow Creek restoration. Approximately 1,500 CY of tailings will be removed from the Airstrip abutment area on Meadow Creek immediately downstream of the previously restored Meadow Creek reach (Upper Site), and approximately 21,000 CY of tailings will be removed from the Schoolhouse tailings impoundment along the EFSFSR (Lower Site). Excavation at the Lower Site includes removal of tailings, mine waste,

and native material within an approximately 190-foot-wide floodplain corridor along the EFSFSR beginning at the Meadow Creek confluence and extending downstream to the existing box culvert. At the Upper Site, the existing Meadow Creek channel will be retained, and tailings removal activities will occur along the margins of the channel and within the proposed floodplain limits. Like design alternative T1, at both the Upper and Lower Sites, mine waste and native material will be removed down to the proposed floodplain elevation (approximately 2 feet above the existing channel invert elevation). If tailings extend below the proposed floodplain elevation, tailings will be over-excavated and backfilled with clean native material to match the proposed grade.

The selected design alternative, T2, provides a high level of performance concerning the toxicity of the waste anticipated to be removed, the location of the wastes in relation to the streams, and the existing habitat that would be impacted by the removal activity. The selected design alternative will be effective in mitigating the risk of tailings erosion into the stream. This design alternative is focused on the EFSFSR reach, which is characterized by over-steepened banks incised through thick tailings deposits with sparse vegetation and has higher erosion potential due to increased stream power below the confluence with Meadow Creek.

The selected design alternative will be effective in reducing the mobility of metals into surface and groundwater, specifically antimony. MWMP testing on different historical mine wastes shows that antimony release from tailings materials is approximately 30 times higher than from other waste materials. Design alternative T2 is likely to result in measurable improvements to surface water quality due to a high percentage of the removed mine waste anticipated to be tailings rather than other forms of contaminated mine waste.

The selected design alternative entails removal of waste materials from the stream and floodplain, could potentially affect Endangered Species Act listed species, and would affect wetlands and riparian areas. However, the selected alternative minimizes impacts to wetlands and riparian areas while resulting in a net gain of wetlands.

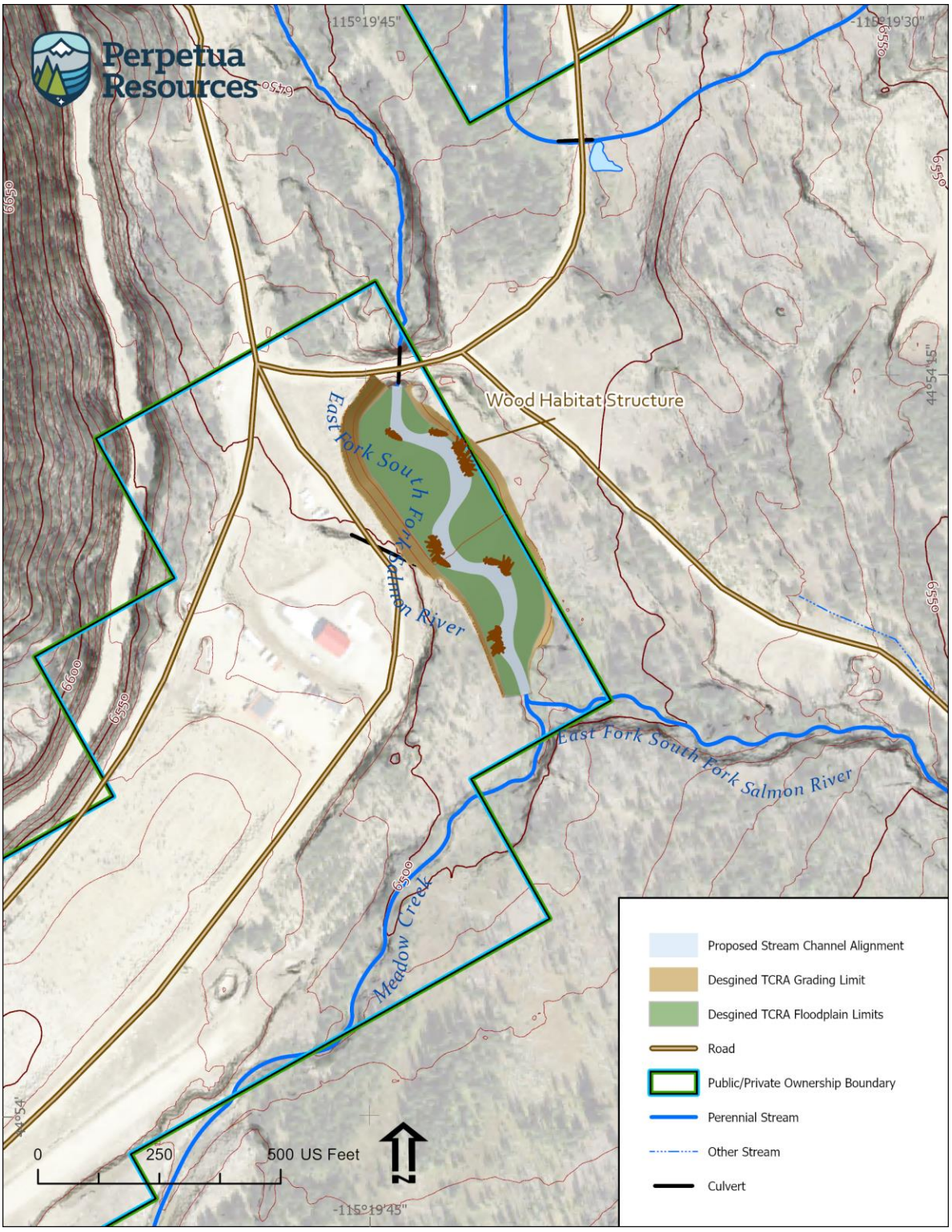

Figure 1-2 Design Alternative T2 – Tailings Ponds

Design Alternative T2 involves construction of 846 feet of new channel, and would minimize the need to establish stream crossings. Any design that would be implemented for the Lower Meadow Creek Removal Action would faces a challenge: it will be difficult to find and procure appropriate materials for backfill and restoration on-site.

The estimated cost of construction for the selected design alternative (design alternative T2) is $1.9 million.

A preliminary engineering design have been prepared for the selected action and data gaps have been identified; filling these data gaps to allow refinement and finalization of these designs is addressed by a separate Field Sampling Plan and Quality Assurance Project Plan. These plans have been revised to guide efforts to address these deficiencies. Data reports produced as an outcome of these field efforts will be used by project engineers to complete the designs and construction management plans.

Perpetua developed a schedule to accomplish all the foregoing activities as well as procedures to gain Agency approval for any changes that may occur as these projects progress. The current schedule includes provisions for collection of all needed data to fill identified gaps during the summer and fall of 2021, with final design packages developed and approval received from EPA and the Forest Service during the winter of 2021-2022. Construction contracts would then be bid, with earth-moving commencing once snow conditions allow during the field season of 2022.

2 INTRODUCTION

Respondents Perpetua Resources Corp., Perpetua Resources Idaho, Inc. (formerly Midas Gold Corp. and Midas Gold Idaho, Inc. respectively), Idaho Gold Resources Company, LLC and Stibnite Gold Company (collectively "Perpetua") prepared a work plan for implementing a Time Critical Removal Action (TCRA) for the Lower Meadow Creek Valley (LMCV) area of the Stibnite Mine (Project area or Site) in Valley County, Idaho (Figure 2-1), including identification of design alternatives (Perpetua, 2021). This TCRA Work Plan has been revised by the U.S. Environmental Protection Agency (EPA) and focuses on the selected design alternative. Perpetua Respondents are implementing the TCRA in accordance with the requirements of an Administrative Settlement Agreement and Order on Consent (ASAOC) for Removal Actions with EPA and U.S. Department of Agriculture Forest Service (USDA-FS or Forest Service) (EPA and USDA-FS, 2021a). The work is being conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

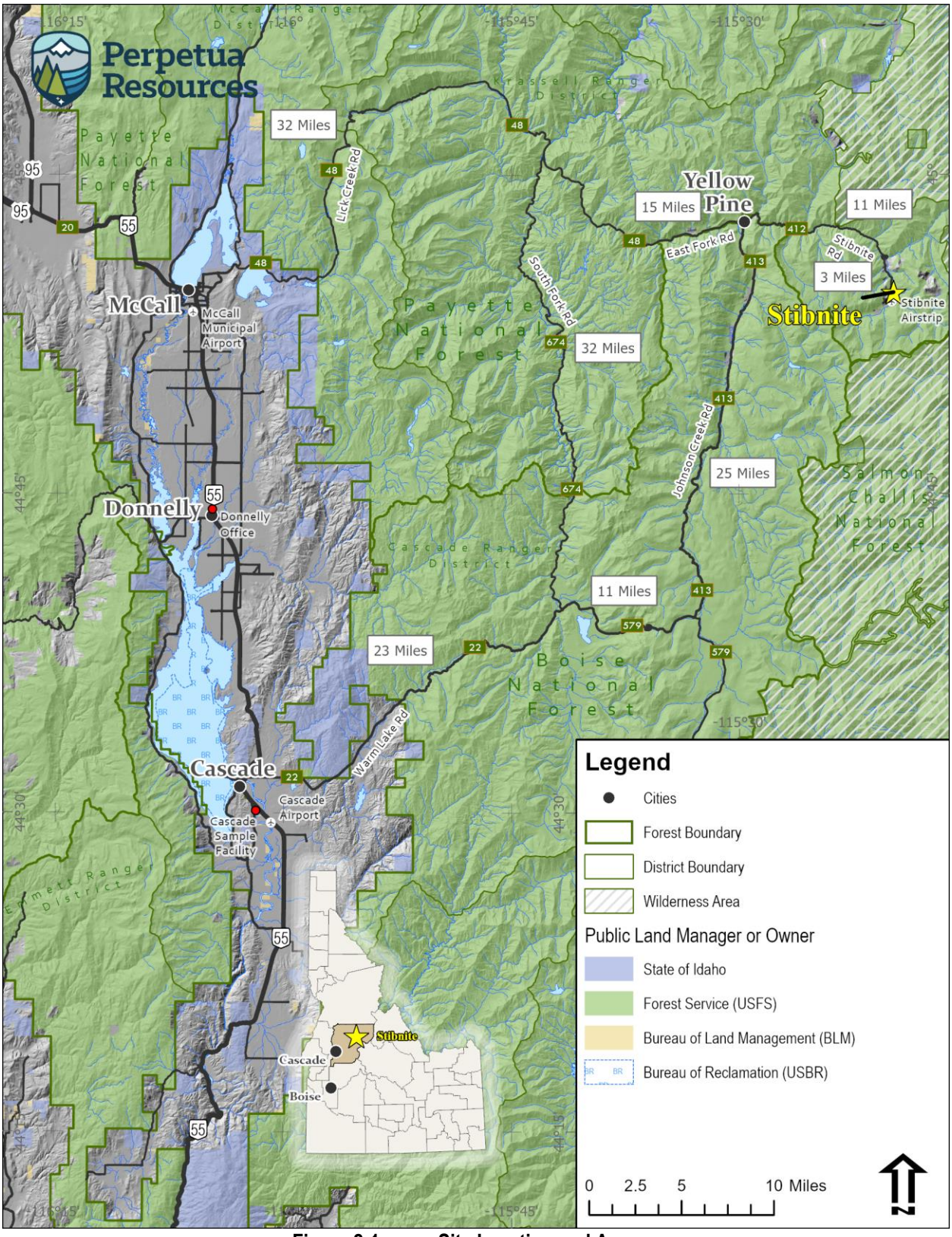

Figure 2-1 Site Location and Access

Two potential design alternatives were developed by Perpetua in the Lower Meadow Creek Tailings Removal TCRA Work Plan (2021) targeting removal of tailings from the banks and floodplain; these two design alternatives are summarized below. Design alternative T2 was selected by the EPA. A more detailed description of the selected design alternative and the rationale for selection is provided in Section 7.

Within the project area described in the EPA and USDA-FS ASAOC Statement of Work (SOW) (EPA and USDA-FS, 2021b), tailings are not thought to occur in the streambed in significant quantities due to historical bed scour revealing a coarse armored substrate following the Blowout Creek dam failure flood event. The design alternatives target different areas of known tailings:

Design Alternative T1 – Lower Meadow Creek. Design Alternative T1 (Figure 2-2) includes removal of tailings, mine waste, and contaminated, commingled, or overlying native material within an approximately 120-foot-wide floodplain corridor along Meadow Creek beginning at the downstream extent of the previously restored Meadow Creek reach and ending approximately 200 feet upstream of the confluence with the East Fork of the South Fork Salmon River (EFSFSR). This alternative targets tailings material on the southeastern bank of Meadow Creek in the area referred to as the Meadow Creek Wetland and will include removal of an estimated 5,000 cubic yards (CY) of tailings materials and 18,000 CY of contaminated or commingled alluvial materials. Mine waste and native material will be removed down to the proposed floodplain elevation (approximately 2 feet above the existing channel invert elevation). If tailings extend below the proposed floodplain elevation, tailings will be over-excavated and backfilled with clean native material to match the proposed grade.

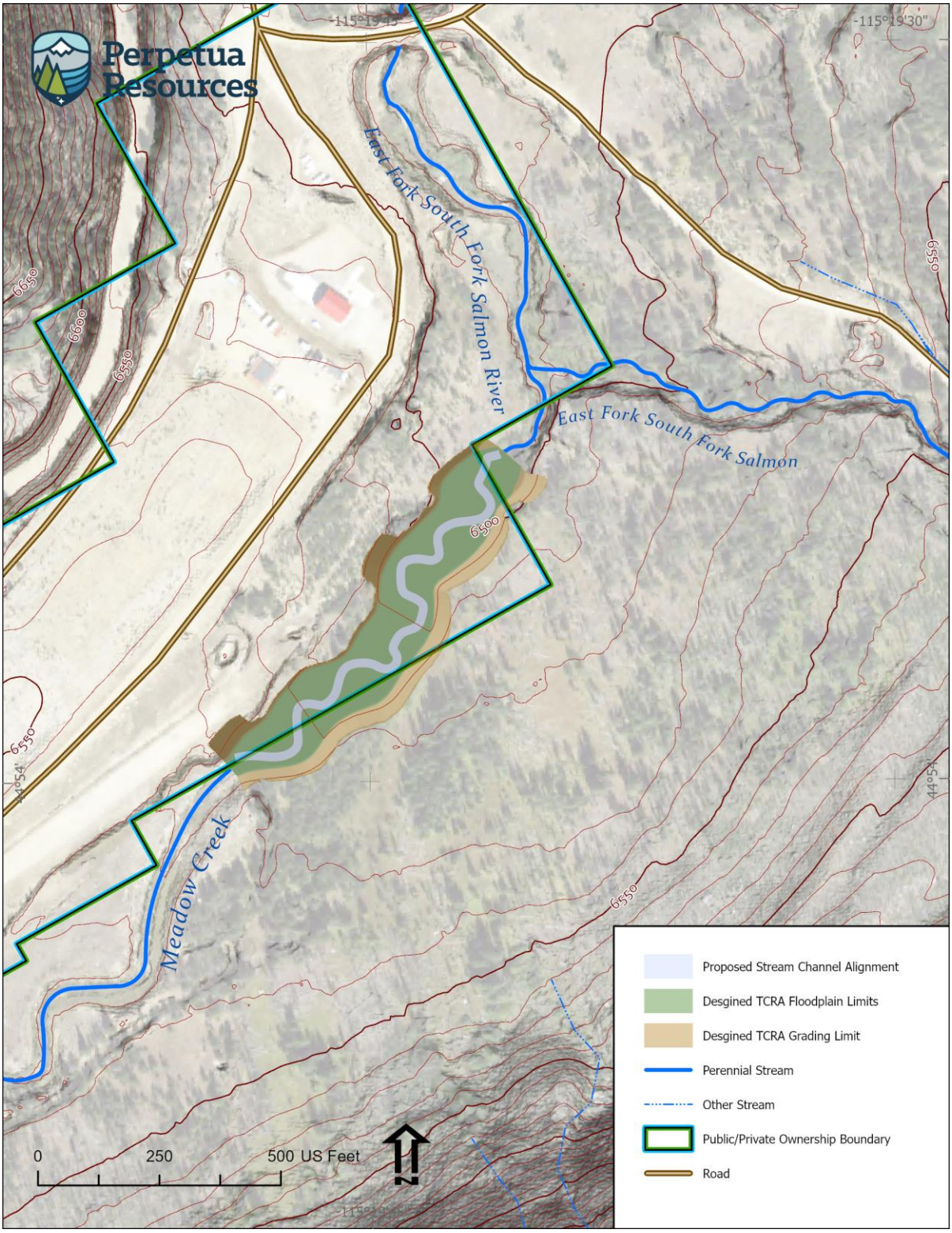

Figure 2-2 Design Alternative T1 – Lower Meadow Creek

Design Alternative T2 – Tailings Ponds. Design Alternative T2 (Figure 2-3) targets tailings materials in the former tailings ponds, which were not removed in the previous Meadow Creek restoration. Approximately 1,500 CY of tailings will be removed from the Airstrip abutment area on Meadow Creek immediately downstream of the previously restored Meadow Creek reach (Upper Site), and approximately 21,000 CY of tailings will be removed from the Schoolhouse tailings impoundment along the EFSFSR (Lower Site). Excavation at the Lower Site includes removal of tailings, mine waste, and native material within an approximately 190-foot-wide floodplain corridor along the EFSFSR beginning at the Meadow Creek confluence and extending downstream to the existing box culvert. At the Upper Site, the existing Meadow Creek channel will be retained, and tailings removal activities will occur along the margins of the channel and within the proposed floodplain limits. Like design Alternative T1, at both the Upper and Lower Sites, mine waste and native material will be removed down to the proposed floodplain elevation (approximately 2 feet above the existing channel invert elevation). If tailings extend below the proposed floodplain elevation, tailings will be over-excavated and backfilled with clean native material to match the proposed grade.

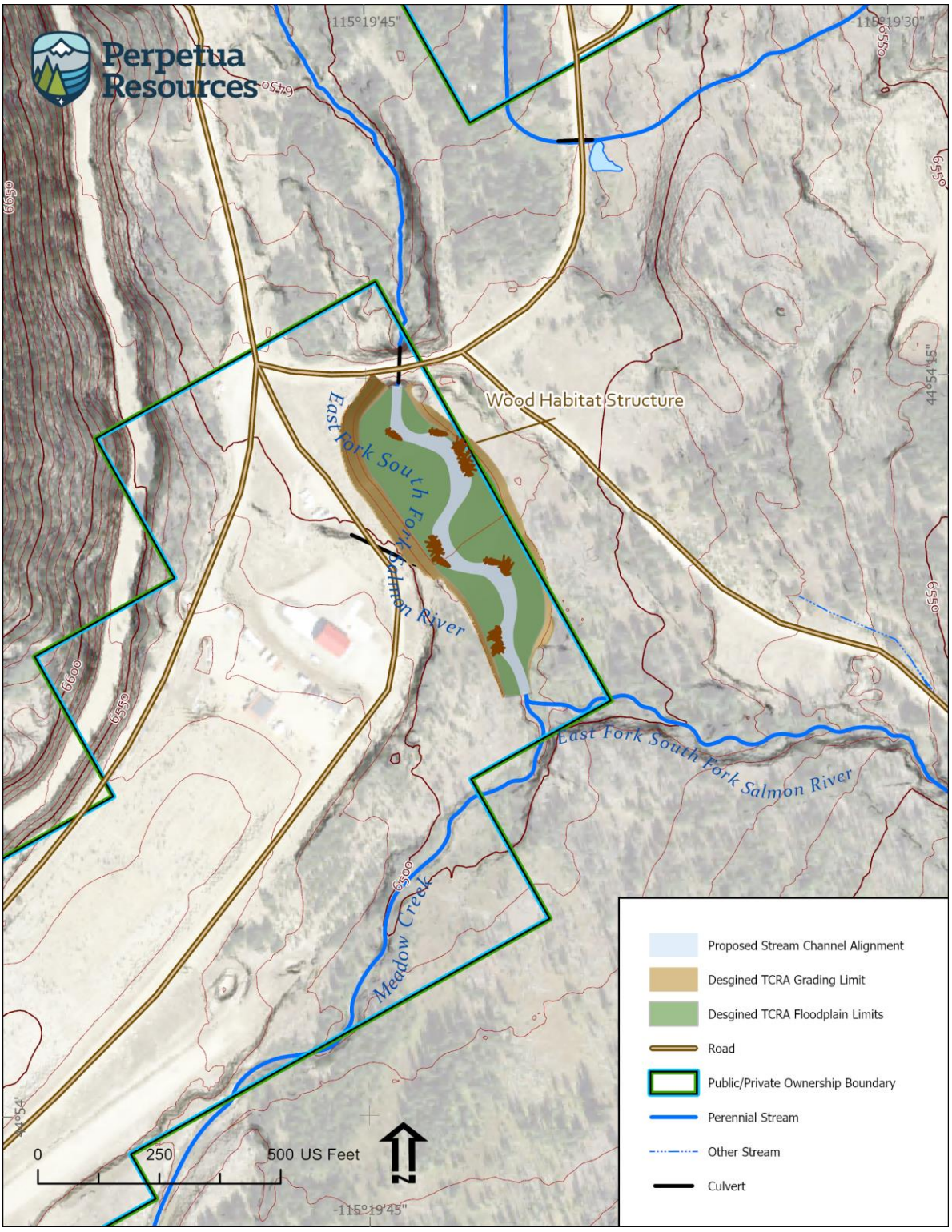

Figure 2-3 Design Alternative T2 – Tailings Ponds

2.1 PURPOSE

Historical operations within the Stibnite Mining District resulted in the placement and deposition of tailings and mine waste within the floodplain of lower Meadow Creek and the EFSFSR. Surface water quality data from the lower reach of Meadow Creek (YP-T-22) and from the EFSFSR below its confluence with Meadow Creek (YP-SR-10) have consistently shown elevated arsenic and antimony concentrations that exceed Idaho's chronic aquatic life water quality standards.

In accordance with the requirements of the ASAOC, Perpetua is conducting a TCRA to remove approximately 25,000 tons of tailings, mine waste, and commingled alluvium within and along the banks of Meadow Creek and the EFSFSR for placement in an on-site repository. The TCRA will focus on a section of the EFSFSR from the confluence with Meadow Creek downstream to the box culvert where Stibnite Road crosses the EFSFSR (Figure 2-4).

The purpose of this TCRA Work Plan is to identify the selected design alternative that best satisfies design considerations and removal action objectives (RAOs). In addition, data gaps are identified related to the physical distribution of tailings and mine waste materials in the removal area and the specific causes of surface water quality degradation that will need to be filled to support the engineering design process. Other supporting information is also included herein to provide for a full understanding of the basis from which the TCRA will proceed.

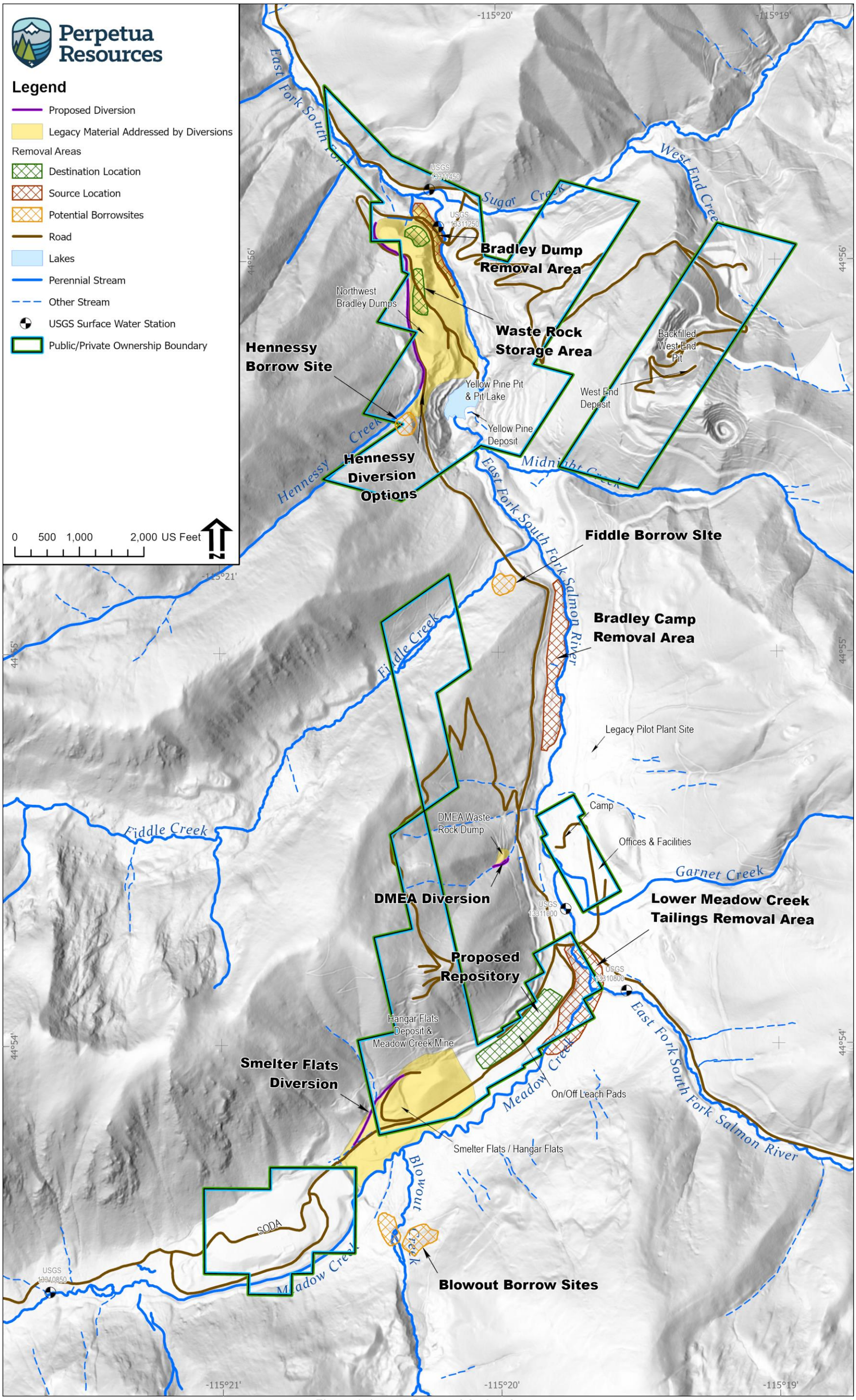

Figure 2-4 Removal Action Areas

2.2 DOCUMENT ORGANIZATION

The remainder of this TCRA Work Plan is organized as follows:

- **Section 3** provides Site background information.
- **Section 4** summarizes key findings of previous environmental assessments, and identifies data needed to support the design of the removal action.
- **Section 5** describes further data needs that will be addressed by the Field Sampling Plan.
- **Section 6** discusses applicable and relevant or appropriate requirements (ARARs).
- **Section 7** discusses selection of the design alternative on the basis of effectiveness and implementability.
- **Section 8** presents RAOs, design considerations, technologies, and design alternatives.
- **Section 9** provides a schedule for implementation of the selected design alternative.
- **Section 10** describes procedures that will be followed for design changes and for obtaining agency (EPA and Forest Service) approval of the changes.
- **Section 11** describes the procedures for complying with EPA's Off-Site Rule.

Supporting information for the TCRA Work Plan is provided in the appendices, including:

- **Appendix A**, Engineering Design Documents.
- **Appendix B**, Environmental Protection Plan.

3 SITE BACKGROUND INFORMATION

The Stibnite Mining District is located in Valley County, approximately 50 miles east of McCall, Idaho (Figure 2-1). The site is located in remote, rugged, high relief terrain on a mixture of private property and public lands administered by the USDA-FS. Additional information regarding the physiography, climate and hydrology, access to the Site, and the mining history of the Site and surrounding area is provided in the following subsections as well as background information on the LMCV tailings areas.

3.1 PHYSIOGRAPHY

The Project Area for the TCRA is located within the Salmon River Mountains of central Idaho (Figure 2-1). The region consists of uplifted rocks of the Idaho Batholith deeply incised by the EFSFSR. The region is characterized by steep, rugged, and forested mountains reaching elevations of approximately 7,800 to 8,900 feet above mean sea level (AMSL). Narrow, flat valleys at an elevation of approximately 6,500 feet AMSL are present along the major drainages. Some of the highest points in the area include Cinnabar Peak (8,900 feet AMSL) along with Sugar Mountain to the north, Antimony Ridge to the west, and Indian Creek Point to the south. The lowest point (just below 6,000 feet AMSL) in the vicinity of the Project Area is along the EFSFSR as it flows northward from the Site. The land is heavily wooded with coniferous trees and shrub understory. Large wildfires burned much of the area in 2002, 2006, and 2007.

3.2 CLIMATE AND PRECIPITATION

The climate is characterized by moderately cold winters and mild summers. Most precipitation occurs as snowfall in the winter and rain during the spring. Weather records indicate that the average precipitation (equivalent rainfall) is approximately 32 inches per year.

3.3 SITE LOCATION AND ACCESS

The Project Area is located approximately 152 road-miles northeast of Boise, Idaho. Figure 2-1 shows a map of current access routes. The primary access to the Project area is known as the Johnson Creek Route and includes the following segments:

- Boise to Cascade – Highway 55 (77.4 miles).
- Cascade to Landmark – two-lane, paved Warm Lake Road (35.6 miles).
- Landmark to Yellow Pine – single-lane, unpaved Johnson Creek Road (25.3 miles).
- Yellow Pine to Stibnite – single-lane, unpaved Stibnite Road (14 miles).

The Johnson Creek Route is approximately 74 miles from Cascade to Stibnite and is impassable during winter months due to excessive snow depths. Alternatively, the South Fork Route provides year-round access to Stibnite in part due to a lower elevation profile. The South Fork Route follows Warm Lake Road before turning north on the South Fork Road and then turning east onto the East Fork Road towards Yellow Pine and on to the Site via Stibnite Road. The distance from Cascade to Stibnite via the South Fork Route is approximately 96 miles.

Another route available in snow-free months starts by travelling east on Lick Creek Road near McCall toward Yellow Pine and onto Stibnite (locally known as the Lick Creek Route). The distance from McCall to Stibnite via this access road is approximately 67 miles and from Cascade to Stibnite via McCall is approximately 94 miles (the distance from Boise to McCall via Highway 55 is 108 miles).

The Site is also accessible via air using a grass airstrip located along Johnson Creek Road approximately 3 miles south of the town of Yellow Pine or using a 2,300 feet-long improved gravel airstrip located at Stibnite. These airstrips are generally not used during the winter months due to the lack of snow removal equipment to maintain the facilities.

3.4 OVERVIEW OF MINING HISTORY

There have been two major periods of exploration, development, and operations in the Stibnite-Yellow Pine Mining District (District) prior to Perpetua's involvement with the property, one spanning from the early 1900s through the 1950s and another during the period from the early 1970s through the mid-1990s. These activities that occurred over the past century have left behind substantial environmental impacts that remain to this day. The history of development and mining in the District is summarized in numerous publications including: Larsen and Livingston (1920), Schrader and Ross (1926), White (1940), Cooper (1951), Hart (1979), Mitchell (2000), and various unpublished reports and documents prepared by Perpetua and others. Much of the information presented herein was obtained from these sources and unpublished Perpetua records.

The mining history of the region began in 1894 when the Caswell Brothers began a sluice box operation along Monumental Creek in what is now known as the Thunder Mountain Mining District, located east of Stibnite. By 1902, a gold rush was underway at that location, along with associated development of roads and creation of the town of Roosevelt. By 1909, the gold rush was essentially over; that spring, a mudslide blocked Monument Creek creating present-day Roosevelt Lake and submerging the town of Roosevelt. During the Thunder Mountain gold rush, many prospectors passed through the area now known as the Stibnite-Yellow Pine District, discovering mercury, antimony, silver, and gold. However, no development of any significance was completed until around 1917 when the World War I demand for mercury led to the development of several properties east of the main Project Area, including the Hermes group of claims located by Pringle Smith in 1902 and the Fern group located by E. H. VanMeter in 1917 (Larsen and Livingston, 1920; Schrader and Ross, 1926).

The first period of large-scale development commenced in the mid-1920s and continued into the 1950s, involving mining of gold, silver, antimony, and tungsten by both underground and, later, open pit mining methods. During World War II, the District is estimated to have produced more than 90 percent (%) of the United States' antimony and approximately 50% of our tungsten. These materials were used in making munitions, steel, fire retardants, and for other purposes. Mining of these strategic minerals was considered so critical that the Federal government subsidized the mining activity, managed site operations, and allowed military time for soldiers to be served at the mine site. Strategic metal mining operations within the District continued through much of the Korean War with antimony, gold, and tungsten mining ceasing in 1952, near the end of that conflict. Milling and toll processing of antimony and tungsten ores from other areas continued intermittently through 1956.

The second period of major activity in the District started with exploration activities in 1974 and was followed by open pit mining and seasonal on-off heap leaching and one-time heap leaching from 1982 to 1997. Ore during this period was provided by multiple operators from several locations and processed in adjacent heap leaching facilities located in LMCV.

Between these periods of development, numerous prospects were discovered and explored using data and information obtained from soil and rock sampling, trenching, drilling, geophysical methods, and geologic mapping. Several of these prospects were developed into successful mining operations.

3.5 OVERVIEW OF LEGAL HISTORY

The Stibnite Mining District has been the subject of significant cost recovery litigation under CERCLA and several consent decrees emerged from these actions.

In Mobil Oil v. United States, Civ. No. 99-1467-A (D. Virginia) (consent decree filed June 26, 2000); the United States ultimately released Mobil Oil Co. (successor to Superior Mining, a former mining operator in the Stibnite Mining District) from future CERCLA response costs and provided $1.55 million to Mobil as partial reimbursement for their response costs. In the settlement, the United States and Mobil Oil exchanged covenants not to sue, though the United States reserved rights as to natural resource damages as well as a future cause of action for up to $1.1 million for the costs of constructing an impermeable cap for the Spent Ore Disposal Area (SODA). The impermeable cap for SODA called for in the Mobil Oil settlement was never constructed.

In United States of America and State of Idaho v. State of J. J. Oberbillig, Case No. CV 02-451-S-LMB (D. Idaho) (consent decree filed March 18, 2004), EPA and USDA-FS resolved outstanding CERCLA litigation related to the Potentially Responsible Party interest in both the Stibnite and Cinnabar Sites. Removal actions at Stibnite called for in the Oberbillig settlement included rerouting a stream around a tailings ore pile and other activities pursuant to Administrative Orders on Consent with Stibnite Mining Inc. and Mobil Oil. In settling the litigation, the Oberbillig Estate paid EPA $116,503 in reimbursed past response costs, the USDA-FS Service $35,703, and the State of Idaho $35,703.

United States v. Bradley Mining Company, Case No. 3:08-CV-03968 TEH and United States v. Bradley Mining Company, Case No. 3:08-CV-05501 TEH (N.D. Ca.) (consent decree filed April 19, 2012) covered several sites in addition to the Stibnite Project. The consent decree concluded two separately filed cases that were consolidated in the United States District Court for the Northern District of California. In exchange for a payment by the United States to EPA for $7.2 million, CERCLA covenants not to sue were extended to the USDA-FS, United States Department of Defense, United States Department of the Interior, EPA, and United States General Services Administration. It is believed that no CERCLA response actions have taken place in the Stibnite Mining District since the Bradley Mining Company case was settled in 2012.

This ASAOC became effective January 15, 2021. The ASAOC expressly found that current water quality monitoring data indicates the presence of elevated levels of aluminum, arsenic, antimony, cyanide, iron, manganese, mercury, and thallium within the Stibnite Mining District. EPA and USDA-FS determined that current Site conditions constitute an actual or threatened release of a hazardous substance, and thus the Phase I TCRAs set forth in the ASAOC are necessary to protect the public health, welfare, or the environment.

The ASAOC declares in paragraph 7 that even though "Phase 1 Work is expected to provide lasting environmental benefits, even if full-scale mining and restoration never occur," the agreement will provide the option for "continued Work under this ASAOC during the [Perpetua] Respondents' execution of the [Plan of Restoration and Operations] (as ultimately reviewed and if approved), while avoiding disruption to the execution of PRO actions," see ASAOC paragraph 10. Accordingly, a longer-term response action strategy (through CERCLA non-time critical removal) is contemplated in subsequent Phases of the ASAOC if the Stibnite Gold Project becomes operational. "Returning a site of historic mining operations with legacy environmental issues to productive operations while addressing those legacy environmental issues has the potential to benefit the environment, economy, and local community." See ASAOC paragraph 10.

3.6 LOWER MEADOW CREEK VALLEY BACKGROUND INFORMATION

The TCRA in this Work Plan focuses on the LMCV area of the Site (Figure 3-1 Tailings Removal Action Area). This area is situated along the lower 1,000-foot reach of Meadow Creek (Reach M6, Figure 3-1 Tailings Removal Action Area) above the confluence of the EFSFSR and approximately 750 feet of the EFSFSR below the confluence and above the Box Culvert (Reach EF1). The Lower Meadow Creek Tailings site is located on both public land managed by the Krassel Ranger District, Payette National Forest and on private land owned by subsidiaries of Perpetua Resources. Surface rights to a small portion of the area are owned by Hecla Mining Company, but Perpetua has the right to utilize the surface estate.

3.6.1 Access to Lower Meadow Creek Valley

Access to the area west of the EFSFSR and Meadow Creek is cross country from the county road or via the existing airstrip. The area west of Meadow Creek and the EFSFSR is open and essentially unvegetated except on the northern end where the former infiltration galleries are present. Access to the floodplain areas east of Meadow Creek and the EFSFSR would require a wet armored crossing or use of a temporary bridge either from the west side of the creeks or across the EFSFSR on the north end and east of the box culvert.

3.6.2 Physiography of Lower Meadow Creek Valley

Aerial photographs from the 1940s-2000s indicate both Meadow Creek and the EFSFSR channels have changed course multiple times over the past 60 to 80 years both from natural processes and anthropogenic activity. The area surrounding the stream reach is generally low relief in character across the entire valley bottom ranging from 0 to 5% and with abrupt transitions to the steep slopes at the valley edges typical of mountainous glaciated terrains. Prior to significant anthropogenic activity, the area likely was heavily forested. The reach currently contains a limited riparian zone, thin stands of lodgepole pine and small wetlands mostly on the upstream M6 portion of the subject reach (Figure 3-1 Tailings Removal Action Area). The upstream end is situated at the northern termination of a reclaimed and restored section of Meadow Creek that was the subject of an NTCRA in 2004-2005 by the Forest Service (URS Corp. [URS], 2006).

The overall average stream gradient through this reach is approximately 3% ranging in elevation from 6,525 feet AMSL at the southwest end near the end of the Forest Service Meadow Creek restoration reach to approximately 6,465 feet AMSL adjacent to the Box Culvert. In the area above the Box Culvert the active wetted channel is 2-4 feet deep and 20-25 feet wide, with similar widths and depths at the southwestern end. The channel banks are relatively steep locally and the incised cut through the surrounding upland terraces ranges from 30 to 50 feet wide and 5 to 6 feet high near the box culvert and from 15 to 55 feet wide and 5 to 10 feet deep on the southwestern end.

Surficial deposits in the removal area consist of variable thicknesses of anthropogenic fill from the 1930s and later and underlying native materials composed of modern alluvial silts, sands and gravels underlain by glacial outwash deposits. The uppermost fill contains legacy tailings materials, flood deposits from the breach of Blowout Creek reservoir (Section 4.1), and mixtures of these and likely other materials related to former water and tailings management structures from the 1930s-1950s. In the removal area the bedrock is not well constrained but nearby boreholes suggest bedrock is approximately 50-75 feet below ground surface toward the edge of the former floodplain and 150-200 feet below ground surface in the area around the box culvert and the center of the valley. Bedrock type is most likely granitoids of the Idaho Batholith based on nearby wells and mineral exploration and geotechnical boreholes that encountered bedrock.

The 2011 Millennium Science and Engineering, Inc. (MSE) Phase II Environmental Analysis (MSE, 2011) and data collection for Stibnite Gold Project (SGP) permitting (Rio Applied Science and Engineering [Rio ASE], 2021) provide geomorphic descriptions and potential for habitat improvements and enhancements for different reaches of Meadow Creek and EFSFSR within the removal area, and are summarized below.

<u>Previously Restored Meadow Creek Reach (2004-2005):</u>

The Meadow Creek realignment is noted to be relatively well balanced between sediment transport and deposition with a channel characterized as relatively low gradient and sinuous, dominated by a sand and gravel bed, becoming gravel and cobble toward the downstream end of the reach where the gradient begins to increase and the channel flows through the grade control structures at the terminus of the restored section.

<u>Lower Meadow Creek Reach (M6):</u>

Downstream of the restored reach of Meadow Creek (Figure 3-1 Tailings Removal Action Area), the channel gradient increases from approximately 1.5% to approximately 2.5%, sinuosity decreases significantly, and the bed composition is dominated by coarse gravel, cobbles and boulders. This reach is characterized by sediment transport, not deposition. Most of this reach exhibits relatively high-quality habitat including numerous pools and large woody debris and dense/robust riparian vegetation. Channel form and structure are functioning appropriately. An armored bed and mature trees (both living and dead from fire) suggest minimal historical fluvial deposition has occurred within this reach. Much of the adjacent floodplain and upland (particularly to the south) is characterized as wetland.

EFSFSR Downstream of Meadow Creek Confluence Reach (EF1):

This reach is incised considerably through anthropogenic fill. The reach has relatively few pools primarily associated with artificial structure (remnant dam and riprap) and completely lacks large woody debris. Riparian vegetation consists of relatively sparse shrubs and few trees. The channel form and morphology have been simplified (i.e., straightened and plane bed) and there is no floodplain connectivity. These poor habitat conditions are the result of channel incision through a former water/tailings retention dam, several former bridges, a water diversion pipeline and significant tailings deposition associated with a historical tailings pond in this reach.

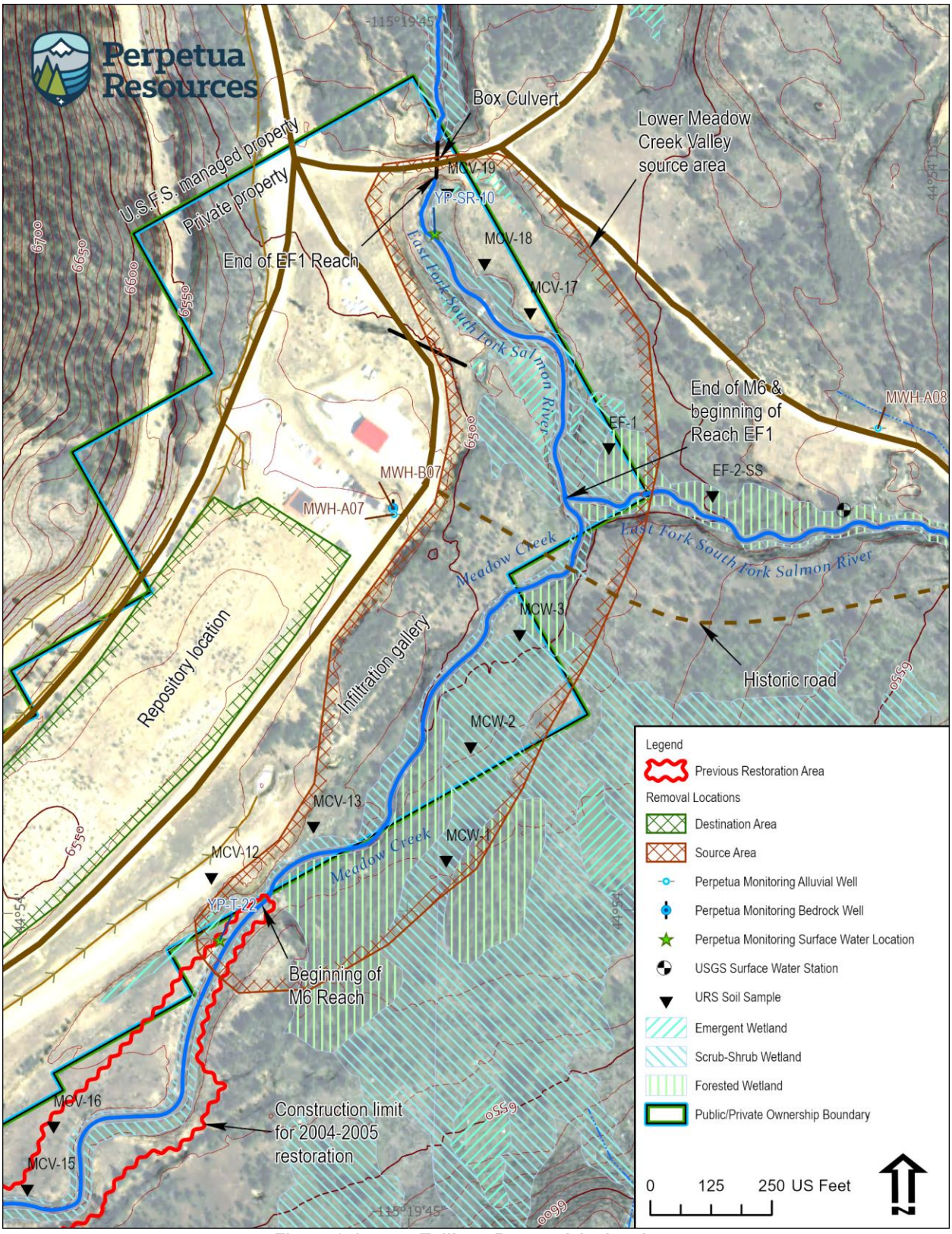

Figure 3-1 Tailings Removal Action Area

4 SOURCES AND NATURE AND EXTENT OF CONTAMINATION

The following subsections describe previous mining and disposal practices in the TCRA area, summarize monitoring results to define the extent of mining related impacts in the area, and identify data needed to support the design of the removal action.

4.1 PREVIOUS MINING ACTIONS AND DISPOSAL PRACTICES

The road leading to the Fern and Cinnabar area and Thunder Mountain that crosses the EFSFSR on the northern end of this area (near the current box culvert) was reportedly opened sometime in the early 1900s, but the date is uncertain. This area was likely first disturbed in the late 1920s or early 1930s when a dam was established near the present-day box culvert to capture water for power generation and use in the Meadow Creek Mill by the Oberbillig interests (United Mercury Mines and successors) and later used as a source for Stibnite townsite water supplies. A 1930s patent application and water diversion applications show a dam below the site of the current box culvert. Interviews with former residents of the town of Stibnite (personal communication from Don Bailey to Chris Dail, 2019) anecdotally reported this 1930s-era dam failed early after construction, likely in 1931 or 1932, but there is no other information on its construction style or failure date available.

Later during mine and mill expansions in the World War II and Korean War era, this area contained at least three dams to capture and recycle water for the mill and Stibnite townsite use, and to constrain tailings (Figure 4-1). Two dams were in the Meadow Creek reach and one was below the confluence. These dams were downstream of an above ground tailings race that used gravity to move tailings slurry from the mill to the ponds with the original water sourced from the Meadow Creek Reservoir (i.e., Blowout Creek). By the mid-1940s, the active Meadow Creek stream channel had been routed to the southeastern side of the floodplain into an unlined ditch, portions of which remain today. The former tailings ponds in this area occupied an area of approximately 8-10 acres. After a landslide in the Yellow Pine pit in the late 1940s or early 1950s damaged the ore load out facilities, the flat area north and west of the current box culvert (Figure 4-1) was used as a stockpile site for antimony and tungsten ores destined for the mill (personal communication, Don Bailey to Chris Dail, 2019). Large angular blocks and boulders of mineralized material are still present at the surface in this area.

The former reservoir located in the East Fork of Meadow Creek that was constructed in the late 1920s or early 1930s was partially breached in 1958 under direction of the Forest Service engineering team and with the concurrence of the State of Idaho Fish and Wildlife staff due to concerns about the condition of the spillway and outfall. The breach in the dam was reportedly 60 feet wide at its base and 20 feet wide at the top and the water level was dropped approximately 13 feet at the time of the breach. After the winter storms of 1964-1965, the dam and its outfall were likely damaged further given the regional extent and sheer intensity of the storms and associated flooding known throughout the Pacific Northwest as the “Christmas Storms.” The dam catastrophically failed in June 1965 sending a massive wave of water, sediment and mine related materials that were entrained in the flood (tailings, mill pond wastes, wood debris, concrete aprons and other materials) downstream. The flood waters washed out numerous bridges and caused extensive flood damage well outside the district. Scour occurred for a significant distance downstream and caused incision of the channel in the lower reach of Meadow Creek and most of the EFSFSR reach below its confluence with Meadow Creek at least to the Yellow Pine pit area as evidenced by blown out bridges and channel conditions. The channel of the EFSFSR at the pit took a more direct downgradient path as a result of the flood. The incision has continued ever since resulting in winnowing out of fine materials (including tailings) in the primary channel of Meadow Creek and the EFSFSR. Remnants of the overbank deposits remain in small terraces and occasionally in stream banks adjacent to the active channel, but it is expected that few if any significant amounts of tailings remain in the active channel of either Meadow Creek or the EFSFSR at this site.

During the early 1980s the box culvert was constructed to replace the former bridge across the EFSFSR. The current box culvert is just downstream of an active U.S. Geological Survey (USGS) stream gage (#13311000) situated on the EFSFSR below its confluence with Meadow Creek and approximately 1,500 feet below a gage in the EFSFSR situated above its confluence with Meadow Creek (#13310800). Both of these gages have been monitored for routine physical and chemical parameters by the USGS (Etheridge, 2015; Baldwin and Etheridge, 2019) from 2011 to the present, and the 13311000 gage was operated intermittently before that, with approximately 40 years of record as of this writing.

The area west of the channel just above the box culvert contains a former stream side roadbed, now partially reclaimed, of unknown age and a 25-foot by 40-foot sediment settling basin developed below a culvert draining the area west of the adjacent Stibnite Road. The area to the northeast of the EFSFSR above the box culvert also contains a small sediment settling basin just south of the road and bridge. This settling basin collects sediment from the county road ditch and from adjacent uplands.

To the south there is a series of shallowly buried leach pad infiltration gallery pipes and surface sprinklers that were constructed and used to dispose of neutralized heap leach process pond and heap leach pad effluents. It is presumed that the system was dismantled at some time in the past, but this is uncertain, and the surface plumbing shutoff valve system and sprinkler heads can still be observed.

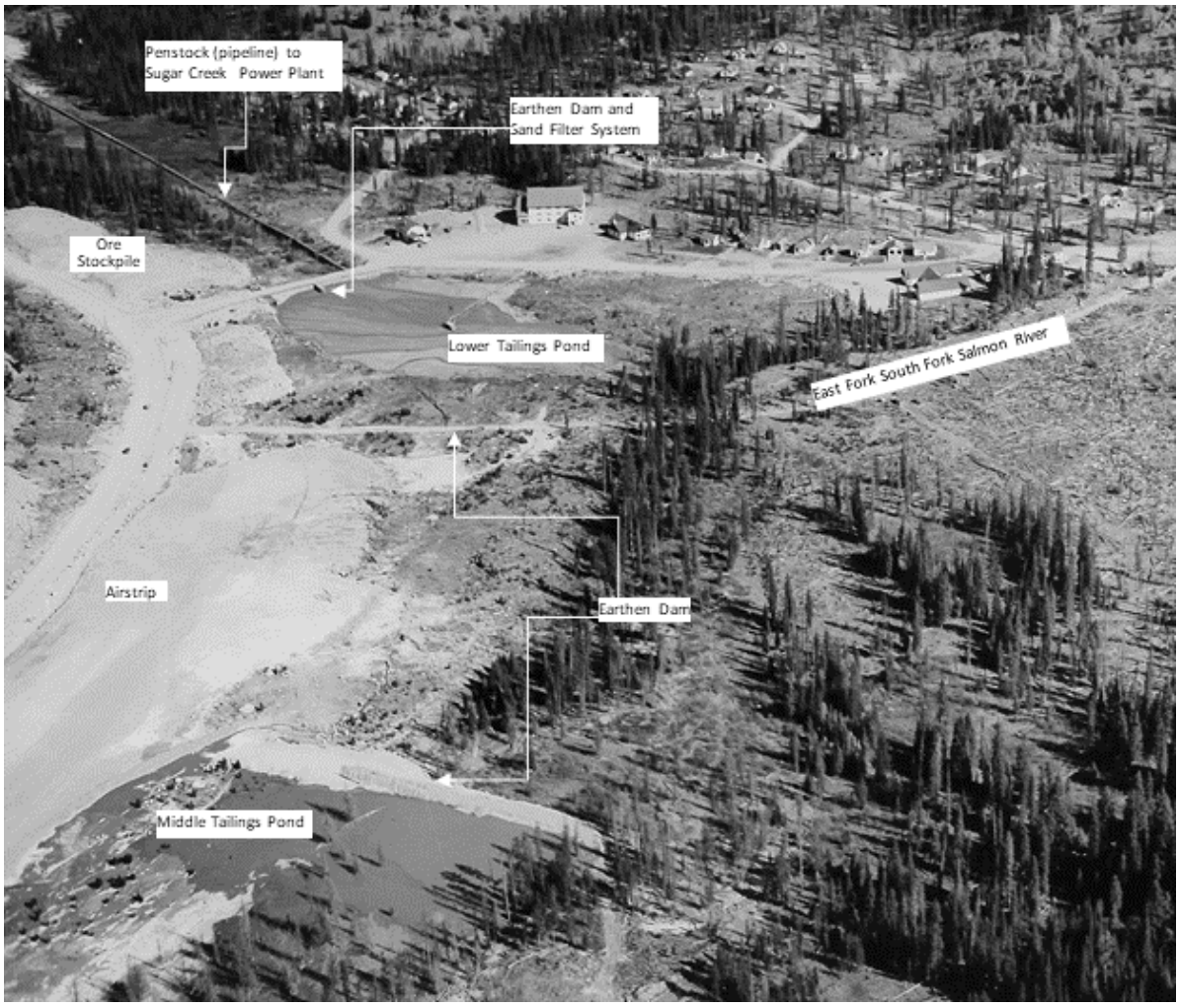

Figure 4-1 Aerial Photograph of Tailings Distribution in Lower Meadow Creek and the EFSFSR (1951)

4.2 REMOVAL AND CLEANUP ACTIONS

The lowermost retaining dam has been breached for many years and a large portion of the remaining dam foundation was blasted open to allow for stream flow by Thorton Construction in 1998 under supervision from Idaho Department of Environmental Quality (IDEQ) and Forest Service on-scene coordinators (OSCs) as part of the agency completion of the Superior Mining, Inc. / Dakota Mines reclamation plan after the operator went bankrupt. Shallow soil sampling was conducted here in 1997-1999 as part of the Stibnite Site Characterization Study (URS, 2000a).

This reach was evaluated in an Engineering Evaluation and Cost Analysis (EE/CA) by Science Applications International Corporation (2003) and the southern portion of the reach on public lands was later the subject of a NTCRA by the Forest Service (URS, 2006). During the NTCRA, which was conducted between 2004 and 2005, tailings and former pond materials were excavated and placed in a repository on the north end of the SODA complex, a new channel was excavated, former channel backfilled and reclaimed, clean aggregate sourced and screened from Blowout Creek and Fiddle Creek was placed, channel structures emplaced, and topsoil and plantings were completed (URS, 2006). Approximately 35,000 CY of tailings were removed from the channel. Approximately 46,000 CY of clean native material was recovered and replaced into the excavation during channel reconstruction. Additional removal action and backfilling of this southern reach was completed in 2009 and 2010 by Thorton Construction working under supervision of the Forest Service OSC. These remedial activities were more extensive than the removal covered in this TCRA and resulted in no adverse biological effects to Endangered Species Act (ESA)-listed species.

4.3 EXTENT OF CONTAMINATION

4.3.1 Tailings Distribution

To support definition of design alternatives and identify data gaps, aerial photography, mapping, and sampling information concerning the distribution, physical properties and metal concentrations of tailings and waste materials in the removal action area was compiled onto Figure 4-2, and are summarized below.

The compilation was based on field mapping conducted by Woodward-Clyde/URS staff as part of a site assessment under a Voluntary Consent Order (URS, 2000a) and supplemented by use of registered aerial photography (Figure 4-3) including 1945 Fairchild aerials concurrent with Bradley operations, 1978 aerials post-dating the Blowout Creek dam failure, late 1999 aerials post-Superior Mining, Inc. operations, 2004 National Agriculture Imagery Program imagery showing Meadow Creek before the 2004-2005 restoration, and 2009 imagery from the LiDAR survey conducted for Midas Gold. The aerial photograph interpretation was aided by oblique photographs such as Figure 4-1. Descriptions of tailings occurrence and analytical sampling results are summarized from URS (2000a).

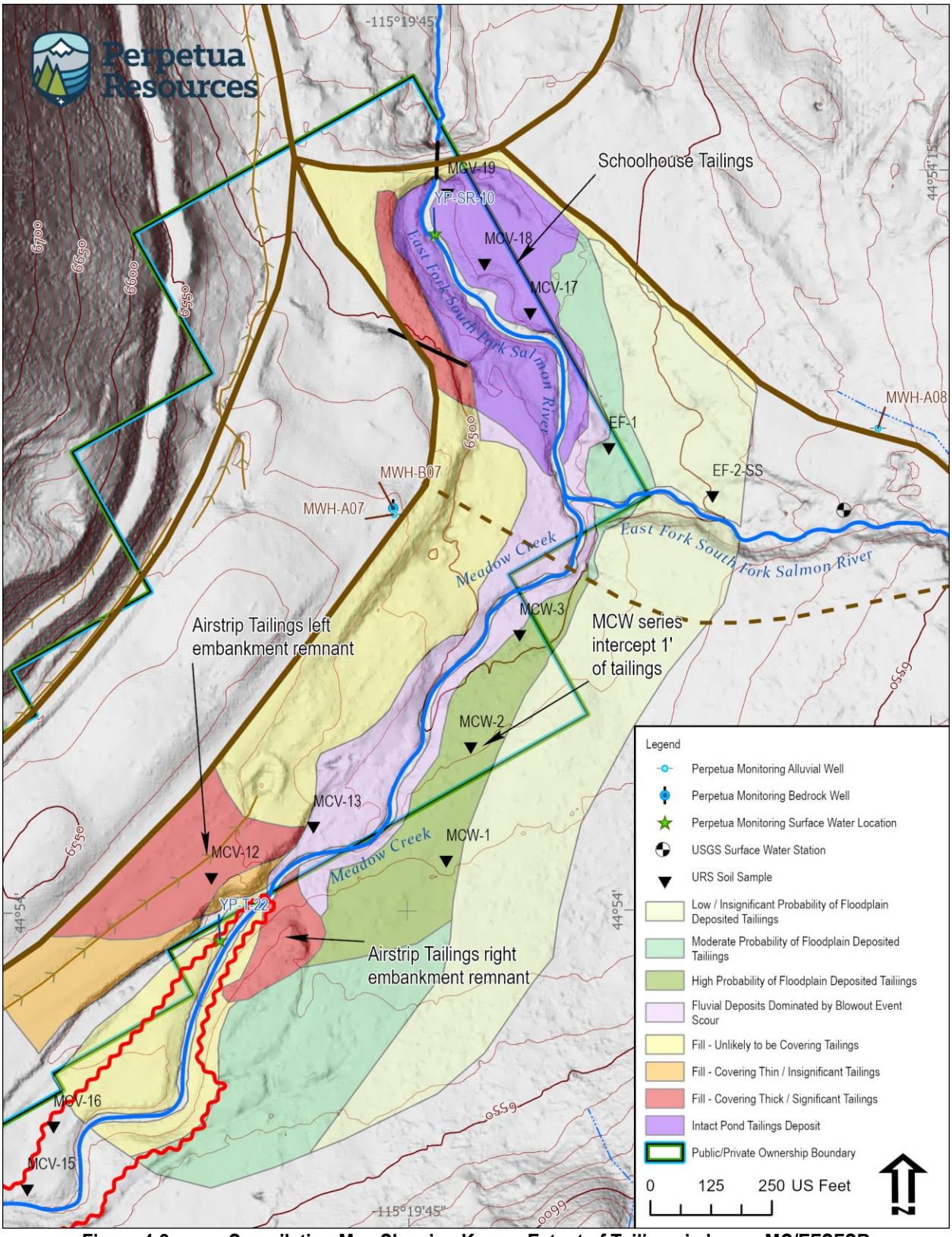

Figure 4-2 Compilation Map Showing Known Extent of Tailings in Lower MC/EFSFSR

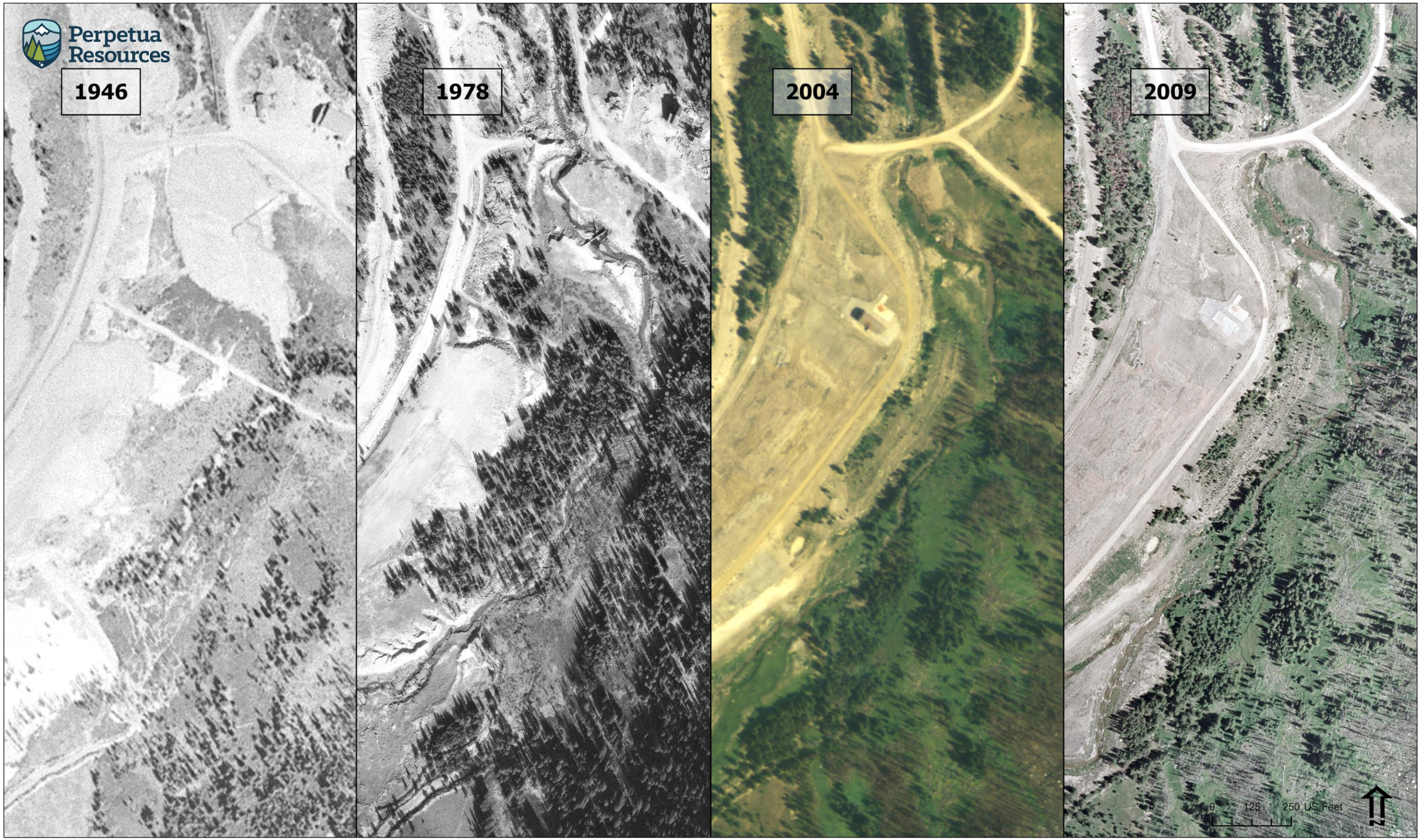

Figure 4-3 Historical Aerial Photography Compilation

The largest identified volumetrically significant areas of tailings in the removal area are along Meadow Creek, adjacent to the airstrip and terminus of the 2005 Meadow Creek Diversion ("Airstrip Tailings"); and along the EFSFSR, beginning approximately 100 feet below the confluence with Meadow Creek and extending to the box culvert; the "Schoolhouse tailings pond," (located across from the historical Stibnite Schoolhouse). Additional deposits of tailings contaminated alluvial sediments, likely re-deposited during the Blowout Creek flood event, are present east of Meadow Creek between the terminus of the 2005 diversion and confluence with the EFSFSR, but have less certain extents and continuity. This area was referred to as the "Meadow Creek Wetland" previously (URS, 2000a).

The Airstrip tailings are remnants of the lower Meadow Creek tailings impoundment (Figure 4-1) not removed in the 2005 Meadow Creek Removal Action and occur on both sides of the lower section of the restored channel. The east abutment, covering approximately 0.5 acres, appears to have been covered and stabilized in the 2005 restoration work based on the photograph record. The west abutment of the Airstrip Tailings was likely buried when the airstrip was relocated with fill placed over tailings in the early 1980s. The lateral extent and thickness of tailings in this area are unknown but may be approximately 2-3 feet thick based on early 2000s photographs of Hecla excavations in the area for their zero valent iron tanks and infiltration galleries. Logs from shallow backhoe test pits in the area north of the channel and near the box culvert (Test Pits 14-20) in 1979 by Northern Testing Laboratories for Canadian Superior plant site characterization studies did not explicitly describe tailings in pits near the box culvert (Northern Testing Laboratories, 1979).

Materials in these areas have not been directly sampled, but samples collected from within the lower Meadow Creek tailings impoundment within the 2005 restoration area are likely similar and are described in the URS Site Characterization Report (Section 8.4.2.2) as follows: "*Sample locations MCV-14, MCV-15 and MCV-16 are on the unvegetated historic Bradley mine tailings pile on the [former] southeast side of Meadow Creek. The soils consist of reddish yellow fine silty sand; this material is neither cohesive nor very plastic in nature*." Analytical results for these samples have concentration ranges of 147 to 2,590 milligrams per kilogram (mg/kg) antimony, 248-1,610 mg/kg arsenic, 11.8-46.9 mg/kg lead, 0.13-0.59 mg/kg mercury, >0.2-0.83 mg/kg selenium, 0.34-3.88 mg/kg silver, and 2.99-60.8 mg/kg sulfate. The volume of tailings estimated in this area is 15,000 CY.

The Schoolhouse tailings pond is estimated to occur over approximately 3.5 acres to a depth of up to 15 feet. The photograph record indicates that a portion of the western margin was covered in fill in the 1980s. Shallow soil samples collected from the schoolhouse tailings area are described in the URS Site Characterization Report as having physical and chemical characteristics consistent with tailings materials. Section 8.4.3 (p.391) describes these as follows: "*During 1997, three samples (MCV-17 to MCV-19) were collected from the exposed historic Bradley mine tailings located on the stream bank of the EFSFSR just below the dam for the old hydroelectric power plant… Sample locations MCV-17, MCV-18 and MCV-19 are located on the terrace above the EFSFSR approximately 6-8 feet above the water surface. The terrace is grassy, possibly due to reclamation of the old hospital and recreation hall. The stream bank is barren, steep and unstable. The soils are fine silty sands that vary in color from pinkish white to reddish yellow. The soil had low to moderate cohesiveness and plasticity, and contained less than 5% coarse fragments*." Average concentrations are reported as 1,393 mg/kg antimony, 568 mg/kg arsenic, 30 mg/kg lead, 0.48 mg/kg mercury, 0.65 mg/kg selenium, 3.6 mg/kg silver, and 171 mg/kg sulfate. The volume of tailings estimated in the eastern area is 25,000 CY.

Tailings distribution is more uncertain in the area near the current channel downstream of the 2005 restoration reach. The photograph record does not show tailings ponds in this area during Bradley Operations, but does show apparent fluvial deposits likely related to the "Christmas Storms" floods of the winter of 1964-1965 and large sediment releases associated with the East Fork Meadow Creek (Blowout Creek) reservoir dam failure and subsequent flood event in the early summer of 1965. East of Meadow Creek, tailings-contaminated flood deposits may occur over 2 acres and are likely laterally discontinuous and thin. The URS Site Characterization Report describes this area as follows (Section 3.4.8, p. 397): "*The Meadow Creek Wetland is in a tailings deposit area in lower Meadow Creek Valley that was identified during the 1997 and 1999 field mapping. This area contains a variety of habitat, including wetland, emergent marsh, meadow and spruce forest. The marsh and wetlands are fed by seeps off the hillsides to the south*

of Meadow Creek." Tailings occurrence is described as thin deposits consistent with redeposition during the Blowout Creek event: "*All Sample locations were well vegetated, and all contained a layer of tailing approximately 12 to 14 inches thick sandwiched between a surficial and deep organic layer. Samples MCW-1 and MCW-2 had the highest metals levels and lowest pH; sample MCW-3 had much lower levels.*" Metal concentrations are described as variable and generally exceeded URS screening levels. The volume of tailings-contaminated flood deposits estimated in this area is up to 3,500 cubic yards.

Additional tailings-contaminated flood deposits may occur west of Meadow Creek downstream of the 2005 restoration reach, but their extent is uncertain and no sampling has been completed.

There does not appear to have been any previous sampling documenting tailings within the streambed of Meadow Creek or EFSFSR. Given the substantial scour and incision associated with the Blowout Creek dam failure and flood, previous headcutting in the system associated with the EFSFSR flowing into the Bradley pit in the 1950s, and the early-2000s reconstruction of the SODA diversion (greatly reducing an upstream tailings source), it appears unlikely that tailings deposits exist within the bed of Meadow Creek. Cobble embeddedness and free matrix measurements were taken in the subject reach of Meadow Creek as part of aquatics baseline work (MWH, 2017) at sites MWH-014 (downstream end of USDA-FS restoration) and MWH-049 (above EFSFSR confluence near the Schoolhouse tailings). These showed continually improving trends in those metrics from 2012 through 2016, likely associated with washout of sediments from the early-2000s forest fires in the watershed, and gradually improving conditions in Blowout Creek. As these studies were focused on fish habitat, they did not differentiate tailings from other fluvial sediments; however, they support the interpretation that, absent a new upstream source, sediment sorting can remove fines from the streambed, even without accounting for incision.

4.3.2 Water Quality

USGS stream gages were installed in the EFSFSR above and below the confluence of the EFSFSR with Meadow Creek in 2012; the one below the confluence re-established an earlier gage site. Water quality samples and discharge measurements are collected from three locations in the removal area as part of Perpetua's baseline water quality monitoring program. Sample location YP-T-22 is located in Meadow Creek 150 feet upstream of the terminus of the 2005 Meadow Creek restoration. Sample location YP-SR-11 is located in the EFSFSR approximately 850 feet upstream of the confluence with Meadow Creek. Sample location YP-SR-10 is located in the EFSFSR approximately 680 feet downstream of the confluence with Meadow Creek and 150 feet upstream of the box culvert. Table 4-1 and Table **4-2** provide summary statistics for flow and water quality for pertinent sample sites from a 2018 Water Quality Summary Report (Midas Gold Idaho Inc., 2019).

Table 4-1 Surface Water Flow Statistics

		Flow Statistics (cfs)			
Station	Name	Mean	Min	Median	Max
YP-T-22	Meadow Creek above EFSFSR	22.0	3.9	7.6	87
YP-SR-11	EFSFSR above Meadow Creek	16.3	3.1	6.3	80
YP-SR-10	EFSFSR below Meadow Creek	38.9	6.2	15.4	169

Table 4-2 Water Quality Statistics for Key Constituents

		Antimony (ug/L)				Arsenic (ug/L)				Mercury (ng/L)			
Station	WQ samples	Min	Max	Mean	Median	Min	Max	Mean	Median	Min	Max	Mean	Median
YP-T-22	90	2.4	38.2	8.1872	5.67	13.6	63.5	36.2678	36.25	0.7	404	8.7385	1.9
YP-SR-11	90*	0.47	1.9	1.0767	1.05	4.3	16.2	10.345	11.35	1.6	37	5.2922	3.7
YP-SR-10	90*	3.93	47.1	12.3932	9.73	8.6	48.7	25.5978	26.6	1	31.5	4.3213	3.1

Instream concentrations of dissolved arsenic generally decrease between YP-T-22 and YP-SR-10 by approximately 25% due to dilution of Meadow Creek water by flow from the upper EFSFSR, which is largely unimpacted by legacy mining activities. In contrast, instream concentrations of dissolved antimony increase by approximately 60% on average through this reach, despite dilution from the upper EFSFSR. The increase in antimony dissolved load is most pronounced during high flow conditions, consistent with spring flushing of near-stream antimony-bearing mine wastes such as the legacy tailings ponds. Mercury concentrations increase at YP-SR-10 due to elevated concentrations in the upper EFSFSR, which drains an area of widespread mercury mineralization and historical mercury mining activities.

This area was also at the lower end of the 2011 USGS isotope dilution tracer synoptic study (USGS 2011). Data from this study show gradual changes in instream concentrations above the confluence with the EFSFSR, except for a location near the terminus of the 2005 restoration reach, which had a spike in concentration of key constituents. The study continued below the confluence, but data showed a large influx of surface water and groundwater at the confluence, which caused significant dilution of the tracers and created less reliable load estimates below this area.

Groundwater quality, measured in monitoring well MWH-B07 located west of the removal area (Figure 3-1 Tailings Removal Action Area), has been monitored regularly as part of Perpetua's ongoing baseline monitoring program. This well indicates significant metal concentrations in alluvial groundwater west of the removal area, especially for antimony. These results are generally consistent with other monitoring wells in Meadow Creek valley demonstrating widespread groundwater degradation but show increased antimony and decreased arsenic relative to upgradient wells.

Table 4-3 Water Quality Statistics for Alluvial Monitoring Well MWH-A07

		Antimony (ug/L)				Arsenic (ug/L)				Mercury (ng/L)			
Station	WQ samples	Min	Max	Mean	Median	Min	Max	Mean	Median	Min	Max	Mean	Median
MWH-A07	58*	48.6	2120	1088.9	1035	21	2510	288.9	157	3.3	92.2	20.6	15

4.3.3 Tailings Geochemistry

SRK Consulting (2017) conducted Meteoric Water Mobility Procedure (MWMP) geochemical characterization testing for National Environmental Policy Act (NEPA) permitting on project development rock, historical waste materials, and surface samples from mineralized areas. MWMP results for 13 composite tailings samples from auger holes in the upper Meadow Creek Bradley tailings (underneath the SODA) have average MWMP release rates of 0.44 milligrams per liter (mg/L) arsenic and 31 mg/L antimony. For comparison, weathered surface samples of altered quartz monzonite (the primary ore host) collected from the Yellow Pine pit, have average MWMP release rates of 0.91 mg/L arsenic and 0.339 mg/L antimony. The high antimony release from the tailings samples is consistent with fine grain size and elevated concentrations of antimony in the tailings resulting from incomplete antimony recovery in historical mineral processing operations.

4.4 DATA GAPS DISCUSSION

The principal uncertainties for design of the removal action concern the physical distribution of tailings and mine waste materials in the removal area and the specific causes of surface water quality degradation observed in the stream reach. An additional uncertainty exists regarding the spatial and chemical extent of contamination of in-situ native materials resulting from contact with groundwater impacted by the millions of tons of mine wastes present in upper Meadow Creek.

Water quality degradation observed through the removal area is possibly attributed to one or a combination of the following:

- Mine wastes occurring adjacent to the stream along the lower Meadow Creek reach, such as tailings in the Meadow Creek Wetland or Airstrip tailings pond.

- Mine wastes occurring adjacent to the stream along the EFSFSR, including the Schoolhouse tailings pond.

- Diffuse groundwater inflows along shallow flow paths controlled by tailings deposits present beneath fill materials used to construct the airstrip.

- Groundwater inflows along the original alignment of Meadow Creek located beneath Smelter Flats and the airstrip.

- Inflows associated with historical water management infrastructure, such as that from the permanent heap leach pad effluent infiltration gallery or the on/off leach pad infiltration gallery plumbing system.

- Natural mineralized rock sources, including but not limited to the Hangar Flats deposit and associated Meadow Creek Fault Zone, which crosses the Meadow Creek valley at the approximate site of the Meadow Creek Mine adit, and runs up the center of the Blowout Creek valley.

5 FIELD SAMPLING AND DATA NEEDS

Proposed field work to support the lower Meadow Creek tailings removal action includes investigations in the tailings removal area and borrow source investigations to identify materials for stream restoration and repository construction purposes. Details on how specific field investigations will be completed are presented in the Field Sampling Plan and Quality Assurance Project Plan (QAPP) (separate documents).

5.1 GOALS AND OBJECTIVES

The primary study objectives of the field investigation are to characterize the vertical extent of mine tailings in the Schoolhouse tailings pond area. These data will inform the preferred removal action and design. Additional study objectives are as follows:

- Establish performance standards for source material removal, including physical and chemical characteristics.
- Understand the engineering characteristics of waste materials.
- Surface water quality data will be collected to support future evaluation of the effectiveness of the removal action and groundwater elevation data will be collected to capture seasonal fluctuations in groundwater.
- Obtain bathymetric and topographic data within the removal area to support the restoration design.
- Determine chemical characteristics (i.e., metals and cyanide concentrations, MWMP leaching metal concentrations, and acid-base accounting), and geotechnical characteristics of the material to be placed in the repository, to inform evaluation of the repository leachate.

6 ARARS IDENTIFICATION AND DISCUSSION

ARARs for the TCRA are defined in the Action Memorandum (EPA and USDA-FS 2021c). Additional guidance and regulatory requirements will be identified in the design packages.

7 SELECTED DESIGN ALTERNATIVE

This section presents a detailed evaluation of the selected design alternative developed for this TCRA. Removal action design alternatives are evaluated against short- and long-term aspects of effectiveness and implementability (EPA, 1991). A general description of each criterion is provided below. Costs are presented below but were not a selection criteria for the TCRA design alternative.

Design Alternative T2 (Tailings Ponds Removal) is the alternative selected for completing this TCRA project, based upon effectiveness and implementability. The agencies agreed to design Alternative T2 via electronic correspondence to Perpetua Resources on June 8, 2021, following a 2-day site visit in early June. Data collected during the summer 2021 field investigation will inform the next level of design.

Design Alternative T2 targets tailings materials in the former tailings ponds, which were not removed in the previous Meadow Creek restoration. Approximately 1,500 CY of tailings will be removed from the Airstrip abutment area on Meadow Creek immediately downstream of the previously-restored Meadow Creek reach (Upper Site), and approximately 21,000 CY of tailings will be removed from the Schoolhouse tailings impoundment along the EFSFSR (Figure 2-2).

7.1 EFFECTIVENESS

The selected design alternative, T2, meets the requirement of removing 25,000 tons of material from the stream channel and banks of Meadow Creek and the EFSFSR and reducing release of metals from waste materials to surface water through relocation to an engineered repository. The selected design alternative also reconstructs the stream channel to restore aquatic and riparian habitat. The selected design alternative T2 provides a high level of performance with respect to the toxicity of wastes anticipated to be removed, the location of wastes in relation to the streams, and the existing habitat that would be impacted by the removal activities. These aspects are discussed in more detail below:

The selected design Alternative T2, targeting former tailings pond materials, will be effective in mitigating the risk of tailings erosion into the stream. This design alternative is focused on the EFSFSR reach, which is characterized by over-steepened banks incised through thick tailings deposits with sparse vegetation, and has higher erosion potential due to increased stream power below the confluence with Meadow Creek. The risk of upstream to downstream recontamination in the selected design alternative is considered low (low potential of occurrence given the existing channel stability in Lower Meadow Creek, and a low magnitude of impact given the expected thin/comingled mine waste upstream of the T2 project extent). On the other hand, if the selected design alternative T2 is not implemented, the risk of exposing and mobilizing contaminated mine waste in the area defined by design Alternative T2 (downstream of the confluence with the EFSFSR) is considered high (high potential of occurrence given the existing channel instability and greater stream power, and a high magnitude of impact given the known large quantity of concentrated mine tailings in this area). The selected design alternative T2 would provide substantial risk reduction.

The selected design alternative will be effective in reducing the mobility of metals into surface and groundwater, specifically antimony. MWMP testing on different historical mine wastes shows that antimony release from tailings materials is approximately 30 times higher than from other waste materials. Design Alternative T2 is likely to result in measurable improvements to surface water quality due to a high percentage of the removed mine waste anticipated to be tailings rather than other forms of contaminated mine waste.

The selected design alternative entails removal of waste materials from the stream and floodplain, could potentially affect ESA listed species, and would affect wetlands and riparian areas. However, the selected alternative minimizes impacts to ecologically beneficial areas while resulting in a net gain of wetlands.

The selected design alternative will reduce release of metals from waste materials to surface water through relocation of wastes to an engineered repository, as detailed in the Bradley Man Camp Dumps Work Plan. It also reconstructs stream channels to restore aquatic and riparian habitat.

7.1.1 Overall Protection of Human Health and the Environment

There is no risk to human health because there are no permanent communities in the area that utilize surface waters from the EFSFSR for domestic use (URS, 2000b). However, there are risks to the environment due to the presence of tailings in and along Meadow Creek. Design alternative T2 targets a reach with relatively high potential for channel migration and bank erosion as the stream is incised into tailings materials and has relatively high stream power below the confluence with Meadow Creek, vegetation here is sparse and tailings in the former Schoolhouse tailings pond are of significant thickness and occur close to the elevation of the stream. Design alternative T2 is, therefore, expected to improve protection of the environment through mitigation of potential for erosion of tailings into the stream.

7.1.2 Compliance with ARARs

Existing surface water quality in Meadow Creek upstream of the removal area exceeds water quality standards. It is possible that removal of a significant volume of tailings, as proposed in design alternative T2, may result in measurable improvements to surface water quality, especially for antimony, which is shown to be mobilized from historical tailings materials at concentrations substantially higher than other waste materials in MWMP tests (SRK, 2017).

Design alternative T2 affects the EF1 reach of EFSFSR in which ESA-listed fish species may be present. The reach contains relatively low quality aquatic habitat with limited hydraulic diversity and sparse riparian vegetation. Excavation and reconstruction of this reach is likely to result in temporary adverse effects to habitat, but existing habitat is currently in poor condition.

Wetlands are present in the removal area primarily along the existing stream corridor and impacts to wetlands associated with the removal action are estimated as 1.3 acres. Creation of a functioning floodplain is anticipated to mitigate approximately 2.6 acres of wetland disturbance (or 2.1 acres when the channel is excluded) resulting in a net gain.

Location-specific ARARs related to construction activity in wetlands and stream diversion in floodplains would be met. Action-specific ARARs for control of fugitive dust emissions would be met. Best management practices (BMPs) would be used to manage storm water runoff and sediment during construction.

7.1.3 Long-Term Effectiveness and Permanence

The design alternative is designed to provide long-term physical effectiveness and permanence. The restored channels are engineered to accommodate flood flows and allow for natural channel migration. Tailings and mining wastes would be excavated from the full floodplain width and remaining terraces would be armored where necessary for long-term stability. The removal of tailings and mining wastes would reduce the magnitude of residual risk. Relocation of these materials to a repository would provide adequate and reliable control.

7.1.4 Reduction of Toxicity, Mobility, or Volume Through Treatment

Design alternative T2 will not reduce the toxicity or volume of waste materials through treatment but would reduce the mobility of metals and their release into surface water through placement of tailings and contaminated, commingled, or overlying alluvial sediments in the engineered repository. The design alternative would remove waste materials from the former tailings impoundments, which are likely to consist primarily of tailings with lesser amounts of fluvial sediments potentially contaminated through exposure to groundwater with elevated metal concentrations. The volume of tailings materials removed in this design alternative is estimated at approximately 22,500 CY with additional removal

of approximately 5,000 CY of native materials, commingled with tailings or potentially contaminated through sorption processes from contact with impacted groundwater.

7.1.5 Short-Term Effectiveness

This design alternative is anticipated to be effective in reducing the release of metals, particularly antimony, during the first peak runoff season following the removal action implementation due to seasonality of constituent concentrations in surface water. The reduction in antimony concentrations in the stream may be measurable at the downstream monitoring location. Additional improvements may be realized over time as the physical stability of the disturbed areas is improved through vegetation growth. Over-excavation of materials in the floodplain corridor and replacement with clean fill may allow for short-term attenuation of arsenic and antimony in shallow groundwater reporting to the stream.

There would be no risks to nearby communities during implementation of the removal actions. Risks to construction workers from mine waste material during construction activities would be mitigated using standard health and safety protocols. Short-term environmental impacts related to construction would be mitigated using standard BMPs. Perpetua has prepared an Environmental Protection Plan (EPP) that outlines the various measures to be taken to protect fisheries, aquatic life, and stream water quality during construction (see Appendix B). The requirement of the ASAOC (EPA and USDA-FS, 2021a) to remove 25,000 tons of tailings and mine waste and for reconstruction of the stream channel and floodplain would be achieved immediately upon completion of construction. The RAO to reduce transport of COCs that contribute to unacceptable ecological risks from mine waste, contaminated soil, and contaminated sediment into surface water, sediment, and groundwater may be achieved but would be dependent upon the volume of tailings and mine waste still present in the Schoolhouse tailings pond area.

7.2 IMPLEMENTABILITY

The selected Design Alternative T2 entails construction of 846 linear feet of new channel. The selected design alternative minimizes channel cross-overs and ecological impacts required for access. Standard earth-moving equipment can be used for alternative construction and the construction can be completed in one field season.

7.2.1 Technical Feasibility

Standard earth-moving equipment (backhoes, loaders, trucks) will be used to construct this design alternative. The reach length is reasonable for completion of construction and restoration activities in one season. Management of surface water in the active stream channel can be accomplished with temporary coffer dams. Construction personnel will need to have standard skills to accomplish the tailings removal. Specialized labor may be required for channel reconstruction and restoration, particularly that component associated with revegetation. The remnants of a concrete dam within the removal area may require specialized demolition practices.

Composition and gradation of materials in potential on-site borrow sources is a significant source of uncertainty and may inhibit the ability to procure sufficient quantities of backfill and armoring materials meeting specifications. An additional implementation consideration is the ability to source native vegetation starters and container plants from specialized nurseries needed for revegetation with limited (<1 year) lead time.

7.2.2 Infrastructure requirements

Off-site power, or other infrastructure improvements, will not be required to support construction of this design alternative.

7.2.3 Reliability and complexity of operation

The design alternative is of moderate complexity to implement. Principal challenges are related to phasing of excavation activities with respect to groundwater elevations adjacent to the stream, in-water fish work windows, and timing of diversion of active channels into new alignments.

7.2.4 Accessibility

Construction activities would commence following lifting of vehicular weight restrictions on site access roads and would require consideration of in-water fish work windows. Access to the western bank of Meadow Creek would be over temporary or re-opened roads. Access to the eastern bank of Meadow Creek would require a temporary bridge capable of conveying heavy truck and equipment traffic.

7.2.5 Administrative Feasibility

From an administrative standpoint, this design alternative would be relatively straightforward to construct. Consultations with appropriate State of Idaho and Federal agencies may be required for approval of the EPP and for stream channel restoration. No offsite treatment, storage, or disposal services would be required because tailings and mine waste removed from the Schoolhouse tailings pond would be moved to the repository to be constructed on the former Canadian Superior Mining heap leach pads, the design of which is discussed in the Bradley Man Camps Dump TCRA Work Plan. The technologies, equipment, and specialists needed to complete the project are readily available.

7.3 COST

The estimated cost to transfer approximately 28,000 CY of floodplain material from the lower Meadow Creek area to the repository and construct 846 feet of channel is $1.88 million (Table 7-1). This will require approximately 11 weeks to complete based on a 7-day per week, day shift only work schedule, assuming concurrent phasing of construction activities, which may not occur. The cost estimate was developed using first principles based on equipment and labor rates published in the USDA-FS Cost Estimating Guide for Road Construction (USDA-FS 2020) and vendor quotes for consumables. Contingencies considered EPA guidance (U.S. Army Corps of Engineers and EPA, 2000), modified as appropriate to account for site-specific conditions. Annual post-construction maintenance is expected to last for 5 years to account for minor repairs to in-stream structures, bank treatments, and additional revegetation as needed.

Table 7-1 Design Alternative T2 Cost Estimate

Cost Item / Footnote	Description	Quantity	Units	Duration (days)	Unit Cost	Cost ($)
1	Salvage organic materials, establish erosion controls, and develop access	3.3	acre	3	$13,437	$44,343
2	Establish water management features	n/a	n/a	5	n/a	$38,000
3	Excavate floodplain material	28,180	yd^3	41	$16.84	$474,475
4	Screen material for engineered streambed and in-stream structures	1,163	yd^3	3	$11.95	$13,897
5	Load, haul, dump, & place screened material	4,363	yd^3	2	$3.69	$16,085
6	Construct fabric encapsulated soil lifts	523	ft	10	$194	$101,682
7	Collect and place live cuttings brush layer	254	ft	1	$18.93	$4,809
8	Construct riffles, toe log structures, wood habitat structures, etc.	846	ft	7	$52.56	$44,468
9	Revegetate floodplain and upland areas	2.40	acre	5	$64,928	$153,230
					Equipment, Labor, & Supplies	**$890,987**

Mobilization / Demobilization (8.0%)	$71,279
Remote Site Room & Board	$167,000
Engineering (10.0%)	$89,099
Overhead (15.0%)	$133,648
Construction Monitoring (5.0%)	$44,549
Annual Post Construction Maintenance (2.5%)	$22,275
Annual Maintenance Net Present Value (5 years)	$106,226
Subtotal	**$1,502,788**
Contingency (25.0%)	$375,697
Total Estimated Cost	**$1,878,484**

Footnotes

Note: All equipment listed below includes operator cost.

1 - Cost based on using a 3-yd^3 excavator, two 40-ton trucks, a 350-HP dozer with ripper attachment, a 48-HP skid steer, a survey crew, three laborers, and a senior project engineer.

2 - Cost based on using a 350-HP dozer with ripper attachment, a 48-HP skid steer, a 99-HP backhoe, three laborers, and erosion control materials.

3 - Cost based on using a 3-yd^3 excavator, two 40-ton trucks, 50% load & haul productivity, a one-mile round-trip haul, a 350-HP dozer with ripper attachment, a 48-HP skid steer, a 99-HP backhoe, a survey crew (50%), and three laborers.

4 - Cost based on using a 110-HP screen plant, 80% screen reject, a 5-yd^3 loader, and a 350-HP dozer with ripper attachment.

5 - Cost based on using a 5-yd^3 loader, two 40-ton trucks, 0.65-mile round-trip haul, a 48-HP skid steer, partial use of a 215-HP dozer, and two laborers.

6 - Cost based on using a 3-yd^3 excavator, a 215-HP dozer, a 48-HP skid steer, two laborers, a survey crew, and a senior project engineer.

7 - Cost based on using a 3-yd^3 excavator, a 48-HP skid steer, and two laborers.

8 - Cost based on using a 3-yd^3 excavator, a 48-HP skid steer, two laborers, and a survey crew.

9 - Cost based on using a 48-HP skid steer, 115-HP mulcher, two laborers, floodplain seed mix, and 4,840 plants per acre.

8 DESIGN CONSIDERATIONS

The design alternatives for the LMCV TCRA were developed to satisfy the requirements of the ASAOC, address the RAOs described below, and satisfy the established selection criteria, also discussed below.

8.1 REMOVAL ACTION OBJECTIVES

As specified in the ASAOC, the removal action described in this Work Plan will include the excavation of approximately 25,000 tons (or approximately 23,000 CY) of tailings and mine waste within and along the banks of Meadow Creek and the EFSFSR for placement in an on-site repository. The TCRA will focus on the section of lower Meadow Creek and the EFSFSR downstream of a previous NTCRA completed by the Forest Service in 2004 and 2005 and upstream of a box culvert road crossing on the EFSFSR (Figure 2-).

The primary goal of the TCRA is to reduce the uncontrolled release of metals to surface water through the removal of tailings and mine waste in contact with Meadow Creek and the EFSFSR. Specific RAOs for the project are:

- Reduce transport of COCs that contribute to unacceptable ecological risks from mine waste, contaminated soil, and contaminated sediment into surface water, sediment, and groundwater.

- Protect surface water and sediment quality in the EFSFSR by consolidating mine waste material, tailings, and impacted soil/sediment in an on-site repository that is a permanent disposal location for the waste materials and eliminates migration of hazardous constituents to the environment.

- Reconstruct stream channels to restore aquatic and riparian habitat.

This work plan evaluates the first and third RAO. The second RAO is evaluated in the Bradley Man Camp Dumps Removal and On-Site Repository Work Plan.

8.2 BASIS FOR DESIGN

Design criteria provide the overall guideposts for project actions to ensure that project components address key constraints and objectives. Design criteria were developed with reference to project goals and objectives.

The excavation design criterion is removal of tailings and mine waste materials to underlying native material, or as required to allow for restoration objectives. The specific performance standard for the excavation will be determined as part of the field investigation, which aims to delineate the extent of tailings and mine waste materials in the removal area.

Portions of the EFSFSR will be modified during the process of removing the tailings and mine waste materials; therefore, design criteria for the final geometry and conditions of that stretch of river are necessary for the long-term performance of the removal action. These stream reconstruction design criteria, including proposed channel geometries, were developed for each reach based on multiple lines of evidence derived from field studies of reference sites (developed for SGP project stream restoration planning); empirical formulae developed from local and regional data; and published design guidelines available in the scientific literature. The reach-specific design criteria were then applied to each alternative to develop a conceptual meander plan and profile, and representative cross sections. From these plans, design quantities were calculated for each alternative. Typical bank treatments and in-channel features were identified, and their designs will be developed to provide habitat diversity and facilitate bank stabilization until riparian vegetation becomes established. Finally, a generalized revegetation and planting plan was developed for specific riparian, wetland, and upland zones to improve long-term bank stability, woody debris recruitment, overhead cover, shade, and terrestrial/wetland habitat. After selection of a preferred design alternative, the conceptual design

will be advanced through multiple iterations of increasing refinement to develop a construction plan that will meet key stream reconstruction objectives including:

- Reconstruct the disturbed channel, banks, and floodplain resulting from mine waste removal.
- Facilitate natural channel processes to maintain diverse habitat to the extent practical.
- Increase instream hydraulic diversity for improved aquatic habitat.
- Increase pool frequency and complexity.
- Increase floodplain connectivity (frequency, duration, and area of floodplain inundation).
- Increase in-channel structure and improve aquatic habitat by incorporating large woody debris structures.
- Create a robust riparian corridor by planting and seeding native species.

Physical design criteria (bankfull width, depth, meander wavelength, meander amplitude, bend radii, meander belt width, and floodplain width) were developed to maximize habitat based on intrinsic potential for Chinook salmon and steelhead access, spawning and initial rearing habitat. Cooney and Holzer (2006) was used to determine intrinsic potential for selected reaches based on channel slope and to inform physical design objectives, as shown in Table 8-1.

Table 8-1 Stream Reconstruction Physical Design

Physical Design Criteria	Units	Meadow Creek	EFSFSR below Meadow Creek
Floodplain Width	ft	120	190
Sinuosity	ratio	1.3	1.3
Slope	%	2.04	1.63
Bankfull Width	ft	18	21.3
Riffle Depth	ft	1.9	2.1

The 2004 USDA-FS design was used as a model for the reconstruction plans when developing the design objectives. The 2004 project design objectives included: remove mine waste, restore stable conditions, provide a functional floodplain and riparian community, optimize aquatic habitat, and prevent or reduce the potential exposure of aquatic organisms to contamination caused by channel erosion. As outlined above, the restoration objectives for the proposed action reflect the 2004 restoration objectives. Specific, quantifiable design criteria on the other hand are necessarily different from the 2004 design. The valley gradient, confinement, and discharge (downstream of the EFSFSR confluence) all differ for the proposed action; therefore, specific channel geometry and plan morphology designs are based on a combination of reference reach data, regional regression equations, and published literature, which are summarized in "Stream Design Report: Stibnite Gold Project" prepared for Perpetua Resources Idaho, Inc. by Rio ASE, March 2021.

As described in the following subsections, the design alternative for the LMCV tailings removal action includes removal of tailings from the banks and floodplain. Tailings are not thought to occur in the streambed in significant quantities due to historical bed scour revealing a coarse armored substrate following the Blowout Creek flood event, as discussed in Section 4.3.1. To meet the specified tonnage, the design alternative is designed to excavate 25,000 tons of materials occurring along the banks of Meadow Creek and the EFSFSR to create a functional floodplain. The design alternative targets an area of known tailings described in Section 4.3. The design alternative would be designed to follow the general approaches in the EPP (Appendix B).

In general, the proposed channel alignment and geometry will be designed to be highly functional from baseflow through bankfull flow. Flood flows are expected to inundate newly created floodplains providing for flow attenuation, sediment storage, and aquatic and terrestrial habitats. Newly constructed channel banks will be designed to be stable (but not locked into position) and will be designed to become revegetated in the shortest amount of time to the extent practical.

Selected Design Alternative T2 (Appendix A, Sheet C-3) includes tailings materials in the former tailings ponds, which were not removed in the previous Meadow Creek restoration. Approximately 1,500 CY of tailings will be removed from the Airstrip abutment area on Meadow Creek immediately downstream of the previously restored Meadow Creek reach (Upper Site), and approximately 21,000 CY of tailings will be removed from the Schoolhouse tailings impoundment along the EFSFSR (Lower Site). Excavation at the Lower Site includes removal of tailings, mine waste, and native material within an approximately 190-foot-wide floodplain corridor along the EFSFSR beginning at the Meadow Creek confluence and extending downstream to the existing box culvert. At the Upper Site, the existing Meadow Creek channel will be retained, and tailings removal activities will occur along the margins of the channel and within the proposed floodplain limits. At both the Upper and Lower Sites, mine waste and native material will be removed down to the proposed floodplain elevation (approximately 2 feet above the existing channel invert elevation). If tailings extend below the proposed floodplain elevation, tailings will be over-excavated and backfilled with clean native material to match proposed grade.

Table 8-2 summarizes the design elements of the selected design alternative T2.

Table 8-2 Elements of Design Alternative T2

Design Element	Units	Alternative T2	Comment
Total New Channel Length	LF	846	From conceptual design
Bankfull Width	FT	21.3	From channel dimension table
Max Belt Width	FT	139	From channel dimension table
Meander Wavelength	FT	236	From channel dimension table
Floodplain Area	SF	117,277	From conceptual design
Pool Spacing	FT	85.2	4 times bankfull width
Total Floodplain Width	FT	256.7	Excludes bankfull channel width
Bankfull Depth	FT	2.1	From channel dimension table
Max Scour Depth	FT	5.6	
Cross Section Area	SF	34.4	From stream design workbook
D50 Mobile	mm	93	From channel dimension table
D100 Streambed	mm	580	
Tailings Removed	CY	22,500	Approximate estimated volume
Native Materials Removed	CY	5,000	Approximate estimated volume

8.3 REMOVAL ACTION TECHNOLOGIES

Tailing excavation, loading, and hauling would be accomplished using standard equipment sized for the task such as small excavators, backhoes, and articulated trucks. Excavation and hauling production rates are expected to be variable depending on the degree of tailings saturation and particle size. Therefore, additional specialized equipment may be required to effectively excavate and haul the tailings. Materials considered not to be mine waste and therefore clean in-situ materials may be reused on the floodplain or elsewhere as backfill and/or hauled to a borrow area or stockpiled as clean fill for future borrow closure recontouring.

Channel banks may be designed to be stable using varies types of bioengineering techniques including fabric encapsulated soil lifts, brush layers, and engineered streambed and streambank materials. Bank structure will also be provided by large woody debris structures. Large woody debris structures will be designed following the U.S. Bureau of Reclamation's Large Woody Materials Risked-Based Design Guidelines (U.S. Bureau of Reclamation, 2014), which

specifies that structures be designed to be stable to a particular average recurrence interval flow based on the estimated risk profile to public safety and property.

The removal action is likely to occur on a mix of public lands and private lands owned by multiple parties. Existing mineral property boundary claim posts within the removal area will be surveyed by a Professional Land Surveyor, removed for excavation, and replaced following restoration activities. Following excavation and prior to backfill and re-grading, surveying will be conducted to track volumes of materials removed from different private and public mineral claims.

8.4 RESOURCE PROTECTION PROCEDURES

Perpetua developed an EPP (provided in Appendix B) to detail overarching measures that will be implemented during removal actions at the Site to ensure protection of human health and the environment. Performance standards and BMPs included in the EPP apply to all phases of the ASAOC implementation.

The Meadow Creek Tailings Removal requires in-water work and work in the floodplain. Construction of selected design alternative T2 is expected to be conducted in accordance with the engineering design requirements and site-specific resource protections. Conservation measures are derived or adapted from Bonneville Power Administration's (BPA) Habitat Improvement Program Handbook (BPA, 2014) and the 2019 programmatic biological opinion for habitat restoration projects in Idaho (National Marine Fisheries Service [NMFS], 2019).

Use of equipment in flowing water will be limited as much as practicable. All equipment will be thoroughly cleaned and inspected prior to entering the Site. The contractor is responsible for compliance with applicable regulations for in-water equipment use. All temporary access roads will be kept in serviceable condition with erosion controls in place. All material and equipment staging will be at least 150 feet away from open water, where practicable.

A Cofferdam and Flow Diversion Plan will be prepared by the construction contractor and shall show details of proposed methods for providing temporary isolation of surface water during construction activities and include methods to temporally block all flow in the creek and divert flow into bypass channels or new channels. Cofferdams will be placed between the active channel and the active work area. Cofferdams and diversions will be constructed to limit turbidity.

Fish salvage activities will be completed by project partners or the Idaho Department of Fish and Game. Salvage operations will include oversight by a qualified fisheries professional experienced in salvage operations and methodologies according to the standards established in the BPA Habitat Improvement Program guidance (BPA, 2014) or NMFS biological opinion (NMFS, 2019) and as incorporated into the EPP for Fisheries and Aquatic Resource Environmental Protection Practices.

Dewatering will allow species to naturally migrate out of the work area and will be gravity fed if possible. If pumps are used, they will include appropriate screening. Seepage water will be pumped to a temporary storage area or upland site to allow water to percolate through soil and vegetation prior to reentering the stream channel. Water reintroduction will be staged to ensure channel stability and safe fish reintroduction. Reclamation objectives are to establish long-term soil stabilization with native vegetation. Newly constructed channel banks will be designed to become revegetated in the shortest amount of time practical.

9 SCHEDULE FOR REMOVAL ACTION

The removal action is proposed to occur in 2022, initiating once snow conditions and vehicular weight restrictions allow mobilization of equipment to the Site. An estimated schedule for the removal activities is summarized below:

- Contractor Procurement: December 1 to April 1, 2022
- Mobilization: May 25 to June 1, 2022
- Site Preparation: June 1 to June 5, 2022
- Construction: June 6 to October 1, 2022
- Demobilization: October 1 to October 5, 2022

Key to meeting this schedule are the following:

- Approval of this work plan by EPA and the Forest Service by September 2021.
- Field investigations to fill data gaps will not require permits prior to proceeding, including construction of a temporary bridge to gain access to the east side of Meadow Creek.
- Agency approval of final designs for the project will be completed by February 2022.
- The lead agencies will complete the formal consultation process to obtain a Biological Opinion from the fisheries agencies prior to contractor procurement, if required.
- Construction contractors are available summer of 2022 and bids to complete the work will be determined to be reasonable and generally in-line with engineers' estimates.
- No unusual wastes (non-mine) will be encountered during construction that would require special treatment as hazardous.
- Suitable borrow materials can be obtained on-site.

10 PROCEDURES FOR PROCESSING DESIGN CHANGES AND AGENCY APPROVALS

In the event that changes to the final design of the selected Design Alternative T2 are necessary, the changes will be documented with Engineering Change Orders (ECOs) and submitted to the Agencies for review and approval prior to construction. The ECOs will describe the proposed design change(s), provide justification for the change(s), and summarize the benefits of the proposed change(s). Agency comments will be incorporate on the ECO (if any), and a final ECO will be issued for Agency signature. Perpetua will work with the Agency representative(s) to collaboratively resolve any substantive design changes identified as necessary during the construction process.

11 PROCEDURES FOR COMPLYING WITH EPA'S OFF-SITE RULE

The Off-Site Rule (40 Code of Federal Regulations 300.440) applies to any removal action involving the off-site transfer of any hazardous substance, or pollutant or contaminant (CERCLA wastes) pursuant to the ASAOC as set forth in Sections 2.5.1, 2.5.2, and 2.5.3 of the SOW (EPA and USDA-FS, 2021b). Once a CERCLA waste has been identified, Perpetua will select a disposal facility and coordinate with EPA Region 10 regarding compliance with the Off-Site Rule. EPA Region 10 will use the compliance criteria and release criteria established in the Off-Site Rule to determine the acceptability of the facility selected for disposal of any such wastes. No off-site disposal is proposed under the removal actions.

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Appendix A Engineering Design Documents

Appendix A:

Engineering Design Documents

Lower Meadow Creek Tailings Removal

TCRA Work Plan

submitted pursuant to

Administrative Settlement and Order on Consent for Removal Actions

(CERCLA Docket No. 10-2021-0034)

Stibnite Mine Site

Stibnite, Valley County, ID

Prepared for:

U.S. Environmental Protection Agency Region 10

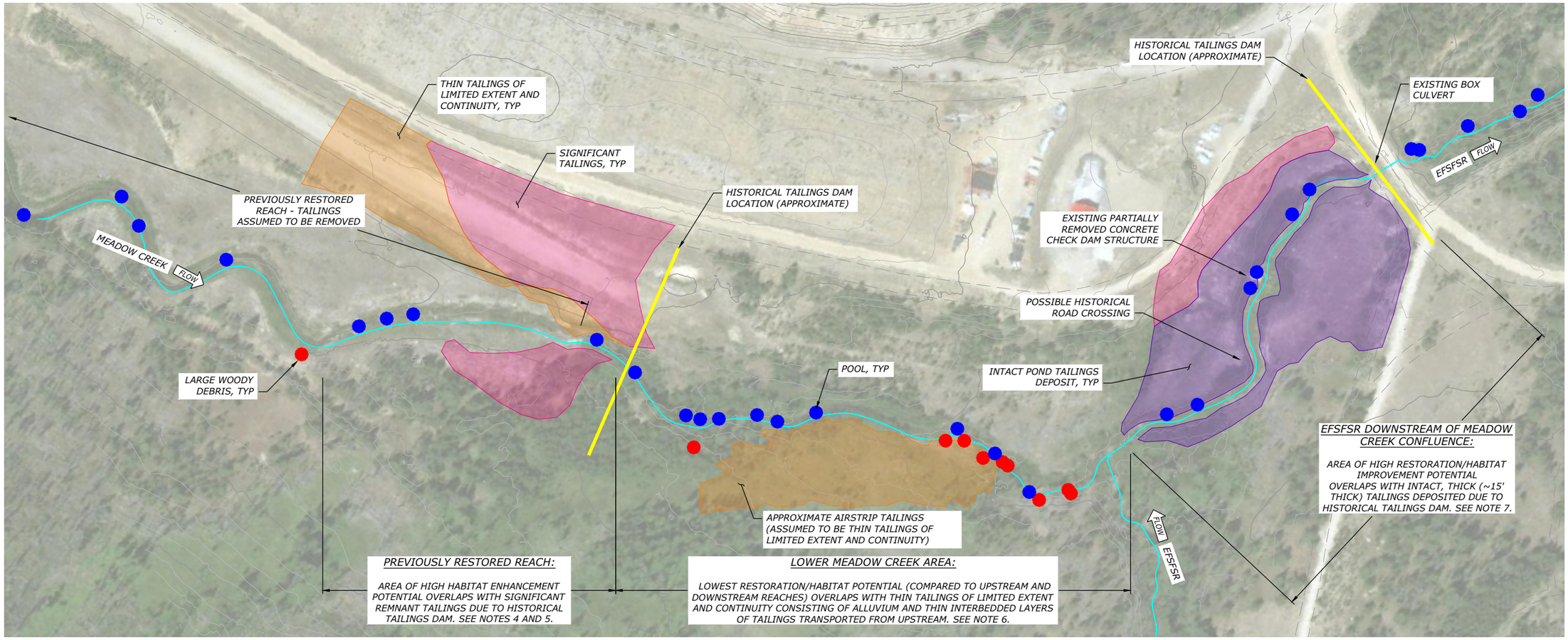
United States Department of Agriculture Forest Service Intermountain Region

Prepared by:

Perpetua Resources

405 S 8th St,
Boise, ID, 83702

July 2021



EXISTING CONDITIONS OVERVIEW

100' 50' 0 100' 200'

SCALE: 1"=100'-0"

RESTORATION OBJECTIVES:

- REMOVE 25,000 TONS (APPROXIMATELY 23,000 CUBIC YARDS) OF MINE WASTE AND INCIDENTAL MATERIAL FROM THE STREAM CHANNEL, BANKS, AND FLOODPLAIN.
- MINIMIZE IMPACTS TO THE EXISTING STREAM, RIPARIAN, AND WETLAND HABITAT.
- RESTORE THE DISTURBED CHANNEL, BANKS, AND FLOODPLAIN RESULTING FROM THE REMOVAL OF MINE WASTE AND INCIDENTAL MATERIAL.

NOTES:

1. EXTENT OF TAILINGS ARE APPROXIMATE; FUTURE FIELD INVESTIGATION IS PROPOSED TO IMPROVE ESTIMATED VERTICAL AND HORIZONTAL TAILINGS DISTRIBUTION.
2. THE TAILING EXTENTS SHOWN REPRESENT ONLY LARGE "SIGNIFICANT" DEPOSITS. FLUVIAL DEPOSITS OF TAILINGS (NOT MAPPED) LIKELY EXIST THROUGHOUT OTHER SUBREACHES WITHIN THE CHANNEL AND FLOODPLAIN. OTHER LARGE TAILING DEPOSITS MAY EXIST THAT ARE NOT KNOWN/SHOWN. FUTURE FIELD INVESTIGATIONS (INCLUDING SUBSURFACE SAMPLING) IS PROPOSED TO IMPROVE THE ESTIMATED TAILINGS DISTRIBUTION ENABLING THE REFINEMENT OF FUTURE DESIGNS.
3. EXISTING LARGE WOODY DEBRIS AND POOL LOCATIONS IDENTIFIED IN THE FIELD BY RIO ASE IN 2019. LOCATIONS ARE APPROXIMATE.
4. LOCATION OF HISTORICAL TAILINGS DAM ARE APPROXIMATE BASED ON HISTORICAL AERIAL PHOTOGRAPHY.

PREVIOUSLY RESTORED MEADOW CREEK REACH:

5. HABITAT WITHIN THIS REACH COULD BE ENHANCED THROUGH THE PLACEMENT OF LARGE WOODY DEBRIS STRUCTURES AND CHANNEL REALIGNMENT TO CREATE GREATER HYDRAULIC DIVERSITY AND FLOODPLAIN CONNECTIVITY. IT IS PRESUMED THAT TAILINGS WITHIN THE REACH WERE REMOVED AS PART OF THE PREVIOUS RESTORATION ACTIONS HOWEVER SIGNIFICANT REMNANT TAILINGS STILL EXIST WITHIN THE FLOODPLAIN AND COULD BE REMOVED IN CONJUNCTION WITH PROPOSED HABITAT ENHANCEMENT OR RESTORATION ACTIONS.

LOWER MEADOW CREEK REACH:

6. THIS REACH EXHIBITS RELATIVELY HIGH QUALITY HABITAT INCLUDING NUMEROUS POOLS AND LARGE WOODY DEBRIS AND DENSE/ROBUST RIPARIAN VEGETATION. CHANNEL FORM AND STRUCTURE ARE FUNCTIONING APPROPRIATELY (SEE REPRESENTATIVE PHOTO). AN ARMORED BED AND MATURE TREES (BOTH LIVING AND RECENTLY DEAD FROM FIRE) SUGGEST MINIMAL HISTORICAL FLUVIAL DEPOSITION HAS OCCURRED WITHIN THIS REACH. THE SMALL VOLUME OF FLUVIAL DEPOSITS ARE LIKELY DOMINATED BY BLOWOUT CREEK SEDIMENT EXPECTED TO BE MIXED WITH THIN AND DISCONTINUOUS AMOUNTS OF REMOBILIZED MINE WASTE FROM UPSTREAM TAILINGS DEPOSITS.

EFSFSR DOWNSTREAM OF MEADOW CREEK CONFLUENCE:

7. THIS REACH HAS RELATIVELY FEW POOLS PRIMARILY ASSOCIATED WITH ARTIFICIAL STRUCTURE (REMNANT DAM AND RIPRAP) AND COMPLETELY LACKS LARGE WOODY DEBRIS. RIPARIAN VEGETATION CONSISTS OF RELATIVELY SPARSE SHRUBS AND FEW TREES. THE CHANNEL FORM AND MORPHOLOGY HAVE BEEN SIMPLIFIED (I.E. STRAIGHTENED AND PLANE BED), AND THERE IS NO FLOODPLAIN CONNECTIVITY. THESE POOR HABITAT CONDITIONS ARE THE RESULT OF THE CHANNEL INCISING THROUGH TAILINGS PREVIOUSLY DEPOSITED IN A HISTORICAL TAILINGS POND AT THIS LOCATION. THE BANKS AND FLOODPLAIN IN THIS AREA HAVE LARGEST ESTIMATED VOLUME OF MINE WASTE RELATIVE TO THE OTHER SITES DESCRIBED ABOVE.

BELOW: REPRESENTATIVE PHOTO OF LOWER MEADOW CREEK AREA.

BELOW: REPRESENTATIVE PHOTO OF EFSFSR DOWNSTREAM OF MEADOW CREEK CONFLUENCE.

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WORKING DRAFT FOR REVIEW AND REVISION

STIBNITE GOLD PROJECT - ASAOC

CONCEPTUAL PROPOSED METHOD

FOR PERPETUA RESOURCES IDAHO, INC

MEADOW CREEK AND EFSFSR CONFLUENCE

VALLEY COUNTY, ID

DATE: APRIL 2021
DESIGNED: JY
APPROVED: --

DRAWING NAME

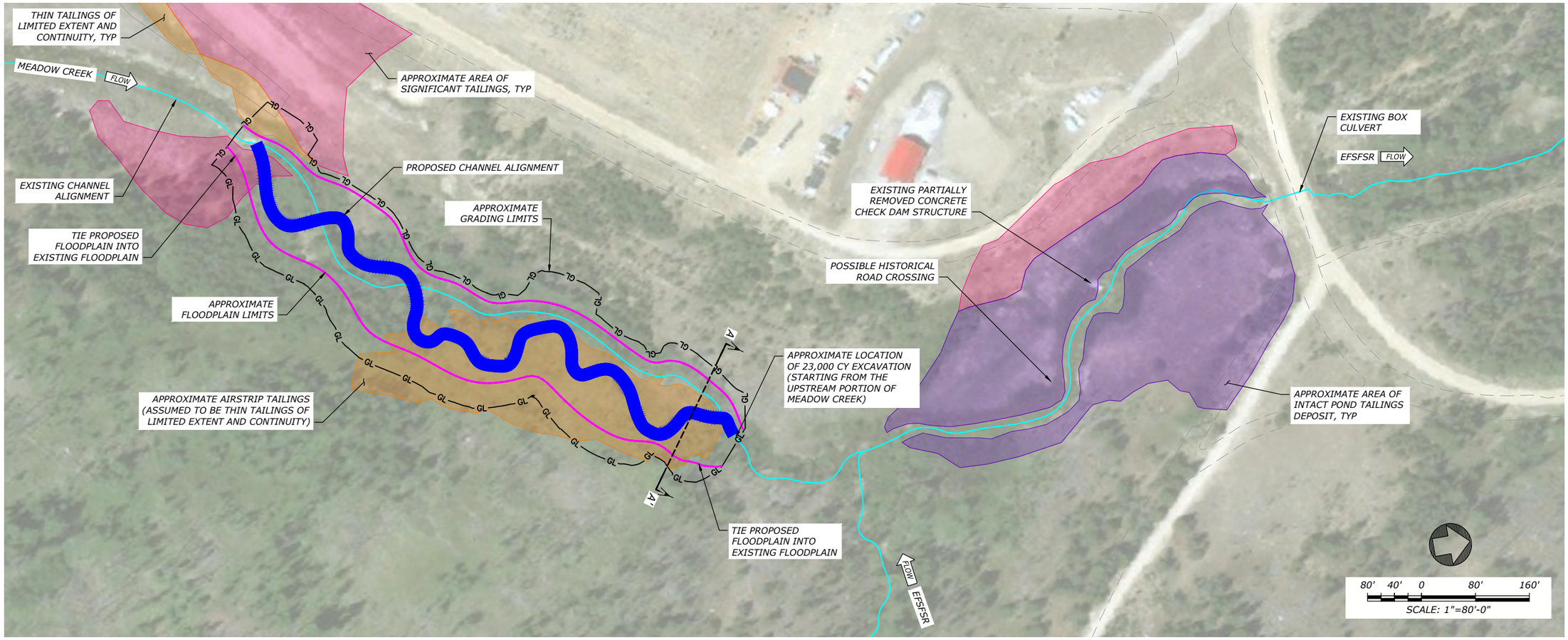
EXISTING CONDITIONS

EXISTING OVERVIEW

DRAWING NO.

C1

SHEET 1 OF 3



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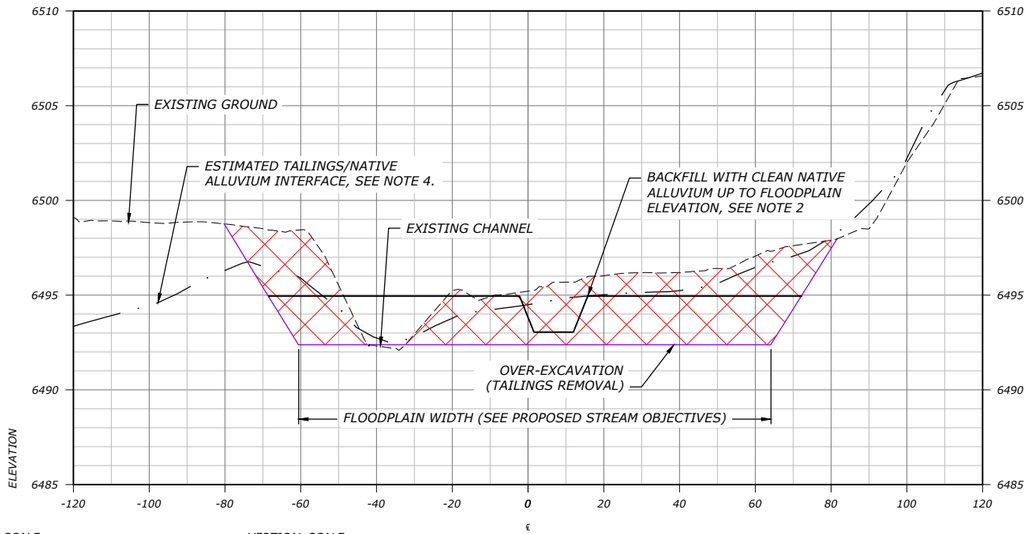

SECTION VIEW A-A'

PROPOSED STREAM OBJECTIVES					
REACH	TARGET FLOODPLAIN WIDTH (FT)	TARGET SINUOSITY	TARGET SLOPE	BANKFULL WIDTH (FT)	RIFFLE DEPTH (FT)
MEADOW CREEK	120	1.3	2.04%	18.0	1.9

TAILINGS REMOVAL SUMMARY			
REACH	EXCAVATION VOLUME (CY)	FLOODPLAIN FILL VOLUME (CY)	POOL EXCAVATION VOLUME (CY)
MEADOW CREEK (AREA AS DENOTED IN PLAN VIEW TO OBTAIN 23,000 CY EXCAVATION)	23,000 CY	9,800 CY	350 CY

NOTES:
1. EXCAVATION VOLUME ASSUMES EXCAVATING DOWN TO THE ELEVATION OF THE CHANNEL INVERT WITHIN THE PROPOSED FLOODPLAIN LIMITS AND INCLUDES 3:1 (H:V) DAYLIGHT CUT SLOPE TO EXISTING GRADES.
2. FLOODPLAIN FILL SHALL BE CLEAN ALLUVIUM MATERIAL PLACED UP TO THE PROPOSED FLOODPLAIN ELEVATION.
3. POOL EXCAVATION VOLUME IS ASSOCIATED WITH MATERIAL BELOW THE DESIGN EXCAVATION ELEVATION (EXISTING CHANNEL INVERT) AS STATED IN NOTE 1. POOL EXCAVATION VOLUME IS ASSUMED TO BE LOCATED WITHIN ONE THIRD OF THE CHANNEL AREA AND ASSUMES A DEPTH EQUAL TO AVERAGE RIFFLE DEPTH.
4. TAILINGS/NATIVE ALLUVIUM INTERFACE ESTIMATED FROM BEST AVAILABLE DATA (EXISTING BORINGS). INTERFACE MAY BE REVISED WITH ADDITIONAL FUTURE FIELD DATA.

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WORKING DRAFT FOR REVIEW AND REVISION

STIBNITE GOLD PROJECT - ASAOC

CONCEPTUAL PROPOSED METHOD

FOR PERPETUA RESOURCES IDAHO, INC

MEADOW CREEK AND EFSFSR CONFLUENCE

VALLEY COUNTY, ID

DATE: APRIL 2021
DESIGNED: JY
APPROVED: --

DRAWING NAME

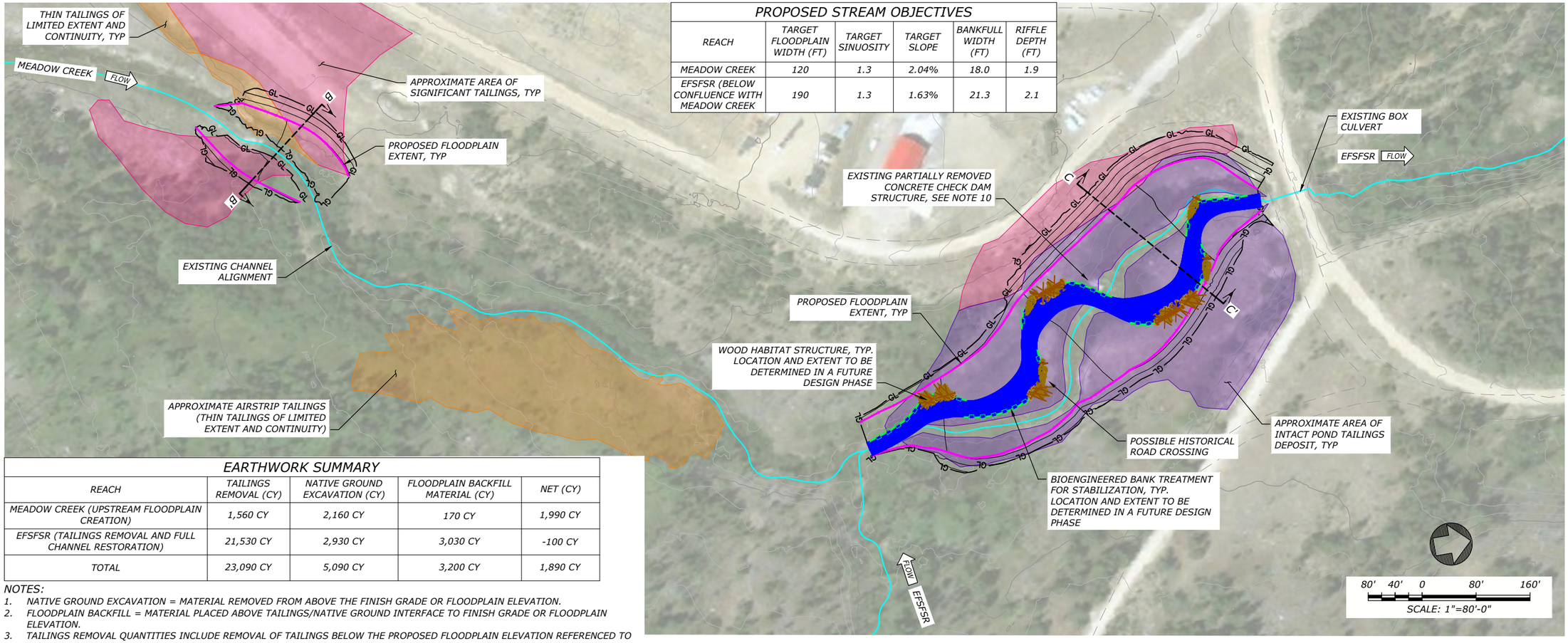
PROPOSED CONDITIONS

ALTERNATIVE 1

DRAWING NO.

C2

SHEET 2 OF 3



ALTERNATIVE 2

PROPOSED STREAM OBJECTIVES

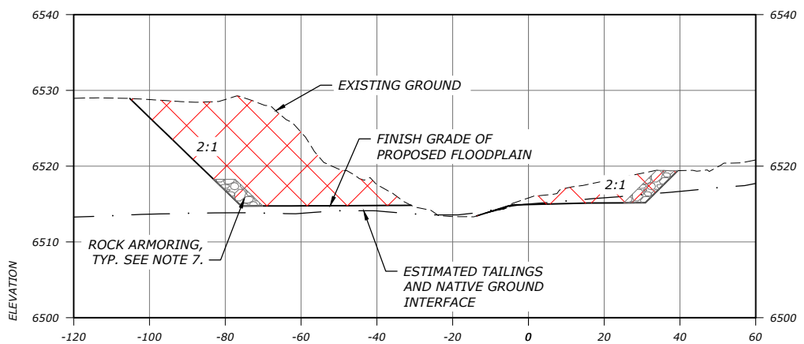
REACH	TARGET FLOODPLAIN WIDTH (FT)	TARGET SINUOSITY	TARGET SLOPE	BANKFULL WIDTH (FT)	RIFFLE DEPTH (FT)
MEADOW CREEK	120	1.3	2.04%	18.0	1.9
EFSFSR (BELOW CONFLUENCE WITH MEADOW CREEK	190	1.3	1.63%	21.3	2.1

EARTHWORK SUMMARY

REACH	TAILINGS REMOVAL (CY)	NATIVE GROUND EXCAVATION (CY)	FLOODPLAIN BACKFILL MATERIAL (CY)	NET (CY)
MEADOW CREEK (UPSTREAM FLOODPLAIN CREATION)	1,560 CY	2,160 CY	170 CY	1,990 CY
EFSFSR (TAILINGS REMOVAL AND FULL CHANNEL RESTORATION)	21,530 CY	2,930 CY	3,030 CY	-100 CY
TOTAL	23,090 CY	5,090 CY	3,200 CY	1,890 CY

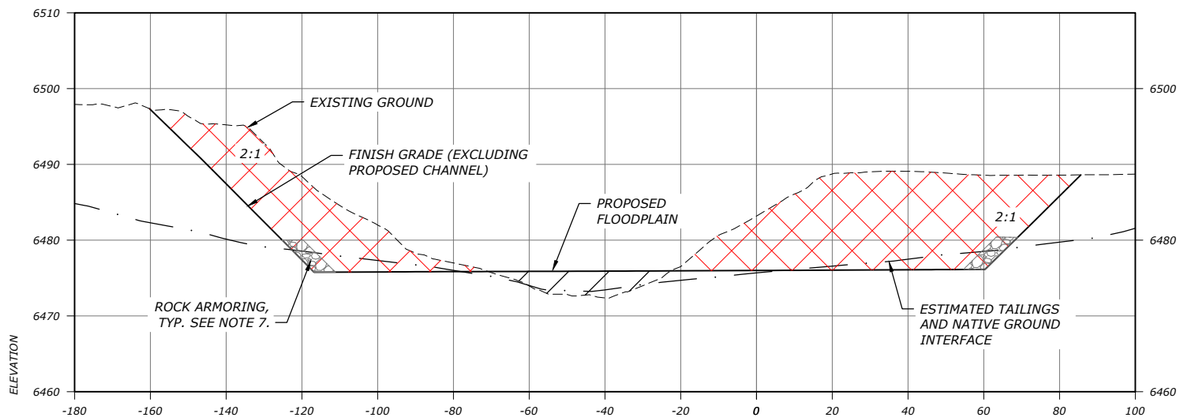
NOTES:

1. NATIVE GROUND EXCAVATION = MATERIAL REMOVED FROM ABOVE THE FINISH GRADE OR FLOODPLAIN ELEVATION.
2. FLOODPLAIN BACKFILL = MATERIAL PLACED ABOVE TAILINGS/NATIVE GROUND INTERFACE TO FINISH GRADE OR FLOODPLAIN ELEVATION.
3. TAILINGS REMOVAL QUANTITIES INCLUDE REMOVAL OF TAILINGS BELOW THE PROPOSED FLOODPLAIN ELEVATION REFERENCED TO THE ESTIMATED NATIVE GROUND ELEVATION SURFACE PROVIDED BY PERPETUA RESOURCES. DESIGN SURFACES INCLUDE 2:1 (H:V) DAYLIGHT CUT SLOPE TO EXISTING GRADES.
4. FLOODPLAIN FILL SHALL BE CLEAN ALLUVIUM MATERIAL PLACED UP TO THE PROPOSED FLOODPLAIN ELEVATION.
5. NATIVE GROUND EXCAVATION AND FLOODPLAIN BACKFILL MATERIAL QUANTITIES ASSUME EARTHWORK WILL INCLUDE CONSTRUCTION OF THE PROPOSED CHANNEL WITH BANKFULL WIDTH OF 21.3 FEET, BANKFULL DEPTH OF 2.1 FEET, SINUOSITY OF 1.3, AND 2:1 SIDE SLOPES.
6. TAILINGS/NATIVE ALLUVIUM INTERFACE ESTIMATED FROM BEST AVAILABLE DATA (EXISTING DRILLINGS / WELL LOGGING). INTERFACE MAY BE REVISED WITH ADDITIONAL FUTURE FIELD DATA.
7. ROCK SLOPE ARMORING ON FLOODPLAIN BACKSLOPE IS ANTICIPATED AT ALL LOCATIONS WHERE TAILINGS ARE PRESENT. ROCK ARMORING SHALL EXTEND UP TO THE 100-YEAR WATER SURFACE ELEVATION.
8. RIPARIAN REVEGETATION IS EXPECTED TO CONSIST OF PLANTING AND SEEDING NATIVE SPECIES THROUGHOUT THE PROPOSED FLOODPLAIN
9. UPLAND PLANTING AND SEEDING IS ANTICIPATED FOR ALL DISTURBED SLOPES. SLOPES MAY REQUIRE MULCHING AND/OR TACKIFIER.
10. THE REMAINING PORTION OF THE EXISTING CONCRETE CHECK DAM STRUCTURE WILL BE REMOVED.



SECTION VIEW B-B'

20' 10' 0 20' 40'
SCALE: 1"=20'-0"



SECTION VIEW C-C'

10' 5' 0 10' 20'
SCALE: 1"=10'-0"

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WORKING DRAFT FOR REVIEW AND REVISION

STIBNITE GOLD PROJECT - ASAOC

CONCEPTUAL PROPOSED METHOD

FOR PERPETUA RESOURCES IDAHO, INC

MEADOW CREEK AND EFSFSR CONFLUENCE

VALLEY COUNTY, ID

DATE: APRIL 2021
DESIGNED: JY
APPROVED: --

DRAWING NAME

PROPOSED CONDITIONS

ALTERNATIVE 2

DRAWING NO.

C3

SHEET 3 OF 3

Appendix B Environmental Protection Plan

Appendix B:

Environmental Protection Plan

Lower Meadow Creek Tailings Removal

TCRA Work Plan

submitted pursuant to

Administrative Settlement and Order on Consent for Removal Actions

(CERCLA Docket No. 10-2021-0034)

Stibnite Mine Site

Stibnite, Valley County, ID

Prepared for:

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Prepared by:

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July 2021

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LIST OF ABBREVIATIONS

ABBREVIATION	DESCRIPTION
ASAOC	Administrative Settlement Agreement and Order on Consent
AST	Above ground storage tank
BMPs	Best management practices
BPA	Bonneville Power Administration
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DOT	Department of Transportation
EPA	U.S. Environmental Protection Agency
EPP	Environmental Protection Plan
ESA	Endangered Species List

ESOP	Environmental Standard Operating Procedure
IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Department of Fish and Game
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
NFS	National Forest System
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
OSC	On-Scene Coordinator
PCF	Project completion form
RCA	Riparian Conservation Area
RMP	Resources Management Plan
SDS	Safety Data Sheet
SGP	Stibnite Gold Project
SPCC	Spill Prevention, Control, and Countermeasure Plan
SWPPP	Stormwater Pollution Prevention Pan
TCRA	Time Critical Removal Action
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service

1. INTRODUCTION AND PURPOSE

Respondents Perpetua Resources Corp., Perpetua Resources Idaho, Inc. (formerly Midas Gold Corp. and Midas Gold Idaho, Inc. Respectively), Idaho Gold Resources Company, LLC and Stibnite Gold Company (collectively "Perpetua Respondents" or "Perpetua") have prepared this Environmental Protection Plan detailing measures to minimize harm to the environment during implementation of Time Critical Removal Actions (TCRAs) in accordance with the requirements of an Administrative Settlement Agreement and Order on Consent (ASAOC) for Removal Actions with the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Agriculture Forest Service (USFS; EPA 2021). The work is being conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

EPA has determined that response actions under the ASAOC are exempted by law from the requirement to obtain Federal, State, or local permits for on-site remedial actions (CERCLA Section 121(e)(1)). However, this does not remove the requirement to meet the substantive provisions of permitting regulations and environmental standards that are established by other regulatory jurisdictions.

The purpose of this Environmental Protection Plan (EPP) is to define and consolidate environmental protection measures relevant to conducting removal actions at the Site. It is intended to detail overarching environmental practices necessary to ensure the protection of human health and the environment, as well as compliance with related environmental agreements. The performance standards and best management practices (BMPs) presented here apply to all phases of the ASAOC implementation. Site specific environmental controls or criteria for each TCRA work element that are unique to the integrity or characteristics of the work element are contained in the individual TCRA Work Plans or resource specific assessments.

2. ACCESS AND TRANSPORTATION

Stibnite is located in remote, mountainous terrain in central Idaho and has limited infrastructure, including roads and facilities. The Site lies within lands managed by the Payette National Forest. There are three existing access routes to the Site from Cascade or McCall, Idaho: the Johnson Creek, South Fork and Lick Creek Routes as shown on Figure 2-1. The Johnson Creek Route is the primary access to the Site during non-winter conditions and relies on Johnson Creek Road (FS 413). The distance from Cascade to Stibnite is approximately 74 miles along this route. The South Fork Route (along FS 474) is the only access to the site in winter months. The distance from Cascade to Stibnite is approximately 96 miles along this route. The Lick Creek route is also available in snow-free months. The distance from McCall to Stibnite along the Lick Creek Route (FS 412) is approximately 67 miles though this route is not proposed to support field activities.

Multiple jurisdictions are responsible for the access routes to the Site, including the State of Idaho, the USFS and Valley County. Access maintenance and improvements are dependent on coordination with the appropriate jurisdiction. The maintenance of certain National Forest System (NFS) roads on the Payette National Forest is coordinated between the USFS and Valley County through Schedule A agreements. This includes 14 miles of roadway between Yellow Pine and Stibnite (FS 412). Perpetua maintains a Road Maintenance Agreement with Valley County for this route that includes general upkeep, dust abatement and snow removal according to the Road Maintenance Standards and BMPs for the Payette National Forest (**Appendix A**).

A large portion of the transportation route for the project is narrow, and unpaved, following river and stream corridors. Within the project area itself, all routes are graveled or unimproved. Temporary access routes for construction will rely on primitive route conditions. Environmental protections for access and transportation are intended to reduce wear on roads and construction access corridors, reduce the potential for accidents and hazardous fuel spills along winding mountain roads, and to preclude erosion and sediment transport from the road system to surface waters.

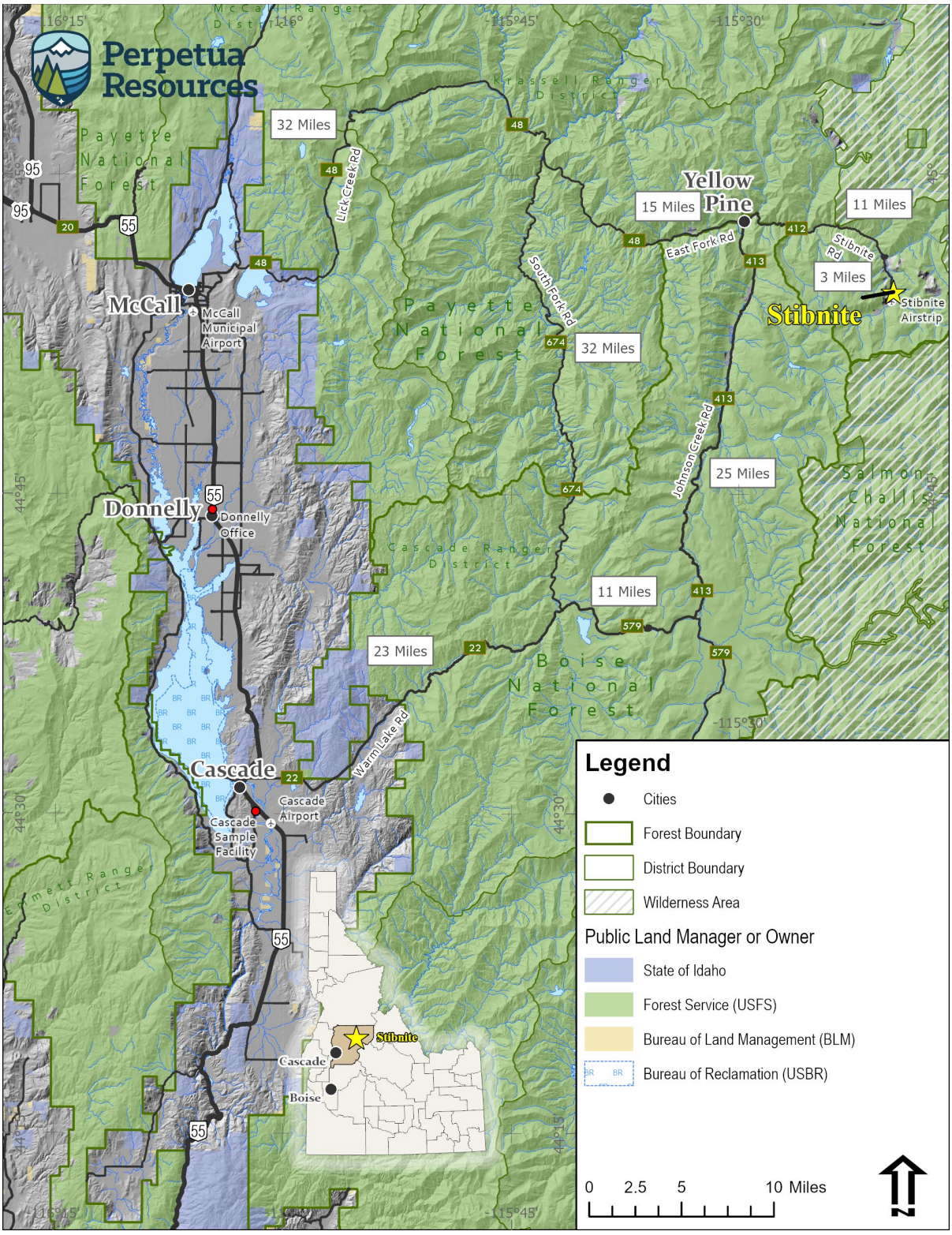

Figure 2-1 Project Location Map

An active private airstrip owned by Perpetua lies adjacent to Meadow Creek near the On/Off Leach Pad . During active haulage operations to the repository, the airstrip will be closed for air traffic. Any scheduled private flights will be coordinated by the site Supervisor and Field Operations Manager. Table 2-1 summarizes environmental protection measures associated with access and transportation that will be implemented during removal actions completed under the ASAOC.

Table 2-1 Access and Transportation Environmental Protection Practices

A. Traffic and Access Management
1. Perpetua will maintain a strict policy for all employees and contractors to obey approved speed limits.
2. Road restrictions and load limits will be observed for all project related travel.
3. Pilot cars will be used during equipment mobilization and demobilization when appropriate. Vehicle to vehicle communication will be maintained for all piloted or convoy transports.
4. Documented annual inspections of commercial transport vehicles will be required. Commercial transport vehicles will also be inspected by the driver at Knox or Landmark prior to accessing Johnson Creek Road. Transport companies are required to document these local vehicle inspections.
5. Tire chains will be required for snow or icy road conditions. All project vehicles will be equipped with properly sized chains for both steering and drive tires. It is not uncommon to receive snow in the region during what are considered summer months. Vehicles will be equipped with appropriate tools and equipment in anticipation of weather events.
6. The South Fork Route from Cascade to Yellow Pine will be used for non-fuel haul project access when Johnson Creek Road is closed due to winter conditions. Commercial fuel hauling will not occur on the South Fork Route in support of ASAOC work.
7. Vehicles will be equipped with appropriate tools and equipment for fire suppression during dry periods.
8. All equipment and materials will be kept within construction limits or road areas to protect the work site and environment from damage.
9. Temporary parking areas will be designated within the work site to accommodate construction personnel and equipment.
B. Road Maintenance and Temporary Access (For those portions of the access route under Perpetua's maintenance authority).
1. Roadways, temporary staging, storage areas and temporary access roads will be maintained in a sound, reasonably serviceable condition.
2. Maintenance may require blading and shaping the roadbed, including shoulders and turnouts to remove ruts, washes, and other irregularities that prevent normal runoff from the road surface.
3. Blading shall restore the road surface without loss of aggregate/gravel surfacing material or natural road base material.
4. All fallen trees, limbs, or brush in the travel way or road ditch line shall be removed and scattered outside the travel way. Rocks and debris hazards will also be removed from the roadway.
5. Temporary access routes will not be constructed in landslide prone areas or areas prone to saturation.
6. Adequate drainage facilities in the form of ditches, culverts, or other conduits will be installed as necessary to maintain temporary access roads. All temporary access and haul roads will have cross drains installed in drainageways.
7. Existing drainage dips and roadside ditches shall be cleaned and reestablished if needed with the out-slope grade restored to equal or exceed the gradient of the road.
8. Snow plowing will include full width snow removal to a smooth ice floor by snowplow equipment.
9. Hazards will be posted as appropriate according to the standards and approval of the road corridor jurisdiction.
10. Road maintenance activities will be avoided during times in which Endangered Species Act (ESA) listed fish are spawning immediately downstream of disturbance.
11. Road maintenance activities will be avoided when surface material is saturated.
12. Hazards, obstacles, and maintenance needs along the entire access route will be reported to the appropriate jurisdiction for coordinated mitigation.
C. Temporary Stream Crossings and Bridges
1. Existing stream crossings will be preferentially used whenever reasonable, and the number of temporary stream crossings will be minimized.
2. Temporary bridges and culverts will be installed to allow for equipment and vehicle crossing over perennial streams during construction. Treated wood shall not be used on temporary bridge crossings or in locations in contact with or directly over water.

3.	Vehicles and machinery shall cross streams at right angles to the main channel whenever possible.
4.	After project completion, temporary stream crossings will be obliterated, and banks restored.
5.	Any large wood, topsoil, and native channel material displaced by construction will be stockpiled for use during site restoration at a specifically identified and flagged area.
D.	**Fuel and Equipment Hauling**
1.	The USFS Project Administrator and Valley County Sheriff Dispatch will be notified a minimum of 48 hours in advance of fuel convoys.
2.	Drivers will be experienced in hauling on backcountry roads and will be familiar with the travel routes.
3.	Hauling will be during daylight hours and in acceptable weather.
4.	Pilot and emergency response vehicles will carry appropriate spill containment and first aid equipment.
5.	Fuel will not be hauled on the weekends along Johnson Creek Road.

3. FUGITIVE DUST CONTROL

Unpaved roads, earth disturbance, soil transport, and material piles have potential to increase particulate emissions associated with remediation activities. Table 3-1 consolidates environmental protection measures associated with fugitive dust control for the removal actions to be completed under the ASAOC.

Table 3-1 Dust Control Environmental Protection Practices

1.	Fugitive dust control will be provided during all phases of project implementation.
2.	The weather forecast and meteorological conditions, as well as daily visible emissions checks will be utilized to reduce dust emissions during project implementation.
3.	Proper dust control will be employed along transportation corridors and active construction areas using aquatic safe dust suppression chemicals (typically magnesium chloride, calcium chloride salts, or lignin sulfonate) or water trucks in accordance with applicable road maintenance agreements.
4.	Dust-abatement additives and stabilization chemicals (typically magnesium chloride, calcium chloride salts, or lignin sulfonate) will not be applied within 25 feet of water or a stream channel and will be applied to minimize the likelihood that they will enter streams.
5.	Perpetua will use their existing, future, or temporary water rights in coordination with Idaho Department of Water Resources for dust suppression activities, as appropriate and required.
6.	Further reduce vehicular speeds and routes of travel during dry periods of high dust generation.
7.	Cover loose soil and debris or wet as appropriate to prevent wind generation of dust.
8.	Limit soil disturbance and sequence work elements as practicable to limit open soil. Retain native vegetative cover as much as possible.
9.	All equipment used for the application of water will be equipped with a positive means of shut-off.

4. EROSION AND SEDIMENT CONTROL

Perpetua maintains a Stormwater Pollution Prevention Plan (SWPPP) for the larger Stibnite Gold Project and has adopted a suite of BMPs for erosion and sediment control based on Idaho Department of Environmental Quality's (IDEQ) *2005 Catalog of Stormwater Best Management Practices for Idaho Cities and Counties* (IDEQ BMP Catalog) (IDEQ 2005). This SWPPP covers areas outside of the ASAOC actions. However, the general standards established are relevant to controlling stormwater runoff for ASAOC activities. As such they have been incorporated into this EPP where applicable (**Appendix B**). Table 4-1 summarizes the list of erosion and sediment control BMPs selected from the IDEQ BMP Catalog. Construction and design specifications are described in full in the IDEQ BMP Catalog.

Erosion and sediment controls will be installed prior to earth disturbing activities. These controls will be installed along the perimeter of disturbed areas that may receive stormwater, except where site conditions prevent the use of such controls (in which case, installation will be modified to maximize their use to the extent practicable). Final stabilization of active construction areas will be initiated immediately following construction completion. If conditions exist where it is not possible to initiate permanent stabilization measures within 14 days, Perpetua will retain existing controls and implement temporary stabilization measures as soon as practicable. Interim measures such as mulching will be employed until permanent vegetative (or other) stabilization is achieved.

Maintenance and inspection of erosion and sediment controls will be conducted and documented weekly at a minimum or more frequently as appropriate. Maintenance will include removal of sediment before it accumulates to one-half of the aboveground height of any sediment or erosion control structure. If erosion and sediment controls require maintenance or corrective action to continue operating effectively, all efforts will be made to fix them immediately after discovery and complete such work in a timely manner. When a control must be replaced or repaired, Perpetua will complete the work within seven days, or as soon practicable.

Table 4-1 Erosion and Sediment Control Environmental Protection Practices[1]

IDEQ BMP #	Description of BMP	
1.	Timing of Construction	Schedule and sequence construction work and erosion control applications to occur when the potential for erosion is lowest.
2.	Staging Areas	Collect runoff from staging and storage areas or divert water flow away from such areas.
3.	Preservation of Vegetation	Protect existing vegetation and utilize natural buffer areas.
4.	Clearing Limits	Minimize the total amount of bare soil exposed.
5.	Stabilization of Entrance and Exit	To limit sediment and debris tracking.
6.	Temporary Roads	Measures to prevent erosion and sedimentation on temporary access.
8.	Cover for Materials and Equipment	Partial or total physical enclosure of materials, equipment, or activities to prevent potential pollutant and material loss.
9.	Stockpile Management	Minimize erosion of any stockpiles from stormwater and wind via temporary cover or watering, as necessary. Prevent up-slope stormwater flows from causing erosion of stockpiles (e.g., divert flows around the stockpile). Minimize sediment from stormwater that runs off stockpiles, using sediment controls (e.g., sediment barrier or downslope sediment control).
15.	Mulching	Temporary to reduce erosion, retain moisture and encourage seed germination. Any straw products used on site will be certified weed free.
20.	Topsoiling	Placement of topsoil or other suitable plant growth material over disturbed areas, when practicable, to provide suitable soil medium for vegetative growth.
21.	Seeding	Use of approved seed mix to prevent weed encroachment and encourage vegetative cover.
23.	Planting	Establish rooted vegetation or vegetative shoots in disturbed areas or as screens.
25.	Slope Roughening	Establish a rough soil surface by creating horizontal grooves, furrows, or depressions, or running parallel to the slope contour.
26.	Gradient Terracing	Establish earth embankments or ridge and channel arrangement constructed along the face of a slope at regular intervals.
30.	Rocked Surface or Slope	Created by an arranged layer or pile of rock placed over the soil surface on slopes. Rocked surfaces protect against erosion and dissipate the energy of runoff or surface water flow.
30., 31.	Outlet and Inlet Protection	Install riprap with filter fabric or mesh at inlets and at or below storm drain outfalls to provide filtering and reduce the speed of concentrated stormwater flows, thereby reducing erosion, scouring, and tracking.

IDEQ BMP #	Description of BMP	
33.	Temporary Stream Crossing	Provides a means for construction vehicles to cross streams or watercourses without moving sediment to streams, without damaging the streambed or channel, and without causing flooding.
35., 36.	Fiber Rolls and Silt Fencing	Assist in sediment control by retaining some of the eroded soil particles and slowing the runoff velocity to allow particle settling.
37.	Vegetative Buffers	A gently sloping area of vegetative cover that runoff water flows through before entering a stream, or other conveyance.
38.	Sediment Traps	A dam or basin used to collect, trap, and store sediment produced by construction activities, or as a flow detention facility for reducing peak runoff rates.
40.	Temporary Swale	Excavated drainage way designed to prevent runoff from entering disturbed areas by intercepting and diverting it to a stabilized outlet, or to intercept water and divert it to a sediment-trapping device.
41.	Earthen Dike	A temporary berm or ridge of compacted soil located in a manner to channel water to a desired location.
43.	Temporary Berms	A ridge of compacted soil, compost, or sandbags which intercepts and diverts runoff from small construction areas.
46.	Dewatering	Reduce, remove or temporarily displace water from watercourses, excavations, and other collection areas.

[1]Derived from IDEQ's *Catalog of Stormwater Best Management Practices* (IDEQ 2005).

5. WASTE MANAGEMENT

In order to effectively manage waste during implementation of ASAOC actions, trash and other miscellaneous inert (non-hazardous) garbage will be collected in bins onsite. Waste will be transported to Donnelly, Idaho where it is collected by the local waste hauler and transported to the Valley County Landfill. Used oils, solvents, grease, and antifreeze will be handled separately from normal trash and garbage. Waste management BMPs are summarized in Table 5-1.

An on-site workcamp will be used during implementation of the ASAOC actions during the snow free months (Figure 5-1). Perpetua also retains a temporary housing trailer that includes a bath house. This camp is located on private property and has a septic drainfield for all toilets, showers, and household water. These facilities will be maintained and staffed by Perpetua, including a camp manager.

If any event occurs during performance of the ASAOC activities that causes or threatens to cause a release of waste material on, at, or from the Site that either constitutes an emergency situation or that may present an immediate threat to public health or welfare or the environment, all appropriate actions will be immediately taken to prevent, abate, or minimize such release or threat of release. These actions will be taken in accordance with the applicable provisions of the ASAOC, including, but not limited to, the Health and Safety Plan (EPA and USFS 2021).

Table 5-1 Environmental Protection Practices for Waste Management

1.	Locate and maintain construction work area and access corridors in a clean, safe, and sanitary condition at all times.
2.	Garbage and trash will be removed regularly and disposed of in an approved waste disposal facility. General clean-up operations will be conducted daily.
3.	Adequate trash receptacles will be provided throughout the work site. All dumpsters will have lids that will be kept firmly closed when not in use.
4.	All facilities will follow local public health standards and regulations.
5.	Any on-site portable toilets will be located away from surface water bodies and will be serviced by a state licensed sewage waste disposal contractor. No garbage will be burned.
6.	At project completion, all equipment, supplies, and refuse will be removed from the project site and disposed of according to established solid and liquid waste management practices and applicable local, state, and federal law.
7.	No toxic or hazardous substances will be used on site, except for standard petroleum fuel and lubricant products (diesel, gasoline, grease, and hydraulic oils), and “over-the- counter” retail products. After completing operations, all empty fuel and lubricant containers will be removed from the operations area and transported and disposed in accordance with local, state, and federal requirements.

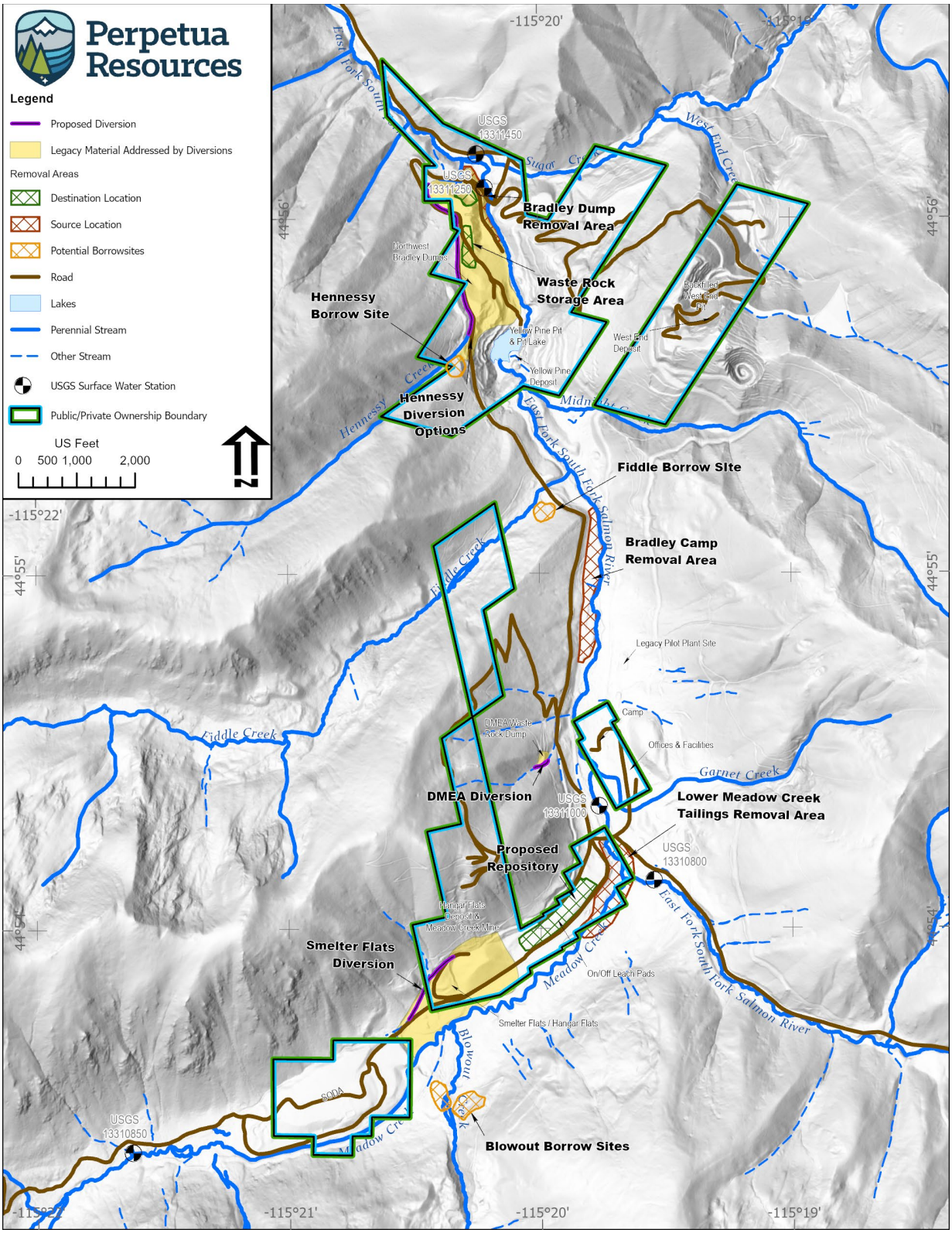

Figure 5-1 Map of ASAOC Locations

6. FUEL HANDLING AND SPILL PREVENTION

Perpetua maintains a Spill Prevention, Control and Countermeasure Plan (SPCC) for the larger Stibnite Gold Project that includes all contact information, reporting requirements and response criteria. The SPCC is included in Appendix C. ASAOC actions will be supported with fuel from the Perpetua fuel site. The Stibnite Project fuel infrastructure is located near the core shed/maintenance shop (Figure 5-1) and includes a primary fuel storage area and a secondary fuel storage area. The primary fuel storage area includes 49,000-gallon (aggregate) diesel fuel storage and has a containment system comprised of a concrete floor that is sloped toward a plugged drain near the center. The sloped design collects any spilled fuel and water, to be disposed of offsite. The containment area is covered with a pole-supported roof to minimize precipitation accumulation within containment.

A secondary fuel storage area is located immediately west of the Shop and contains two aboveground storage tanks (AST) consisting of two 2,500-gallon, double-walled gasoline tanks within tertiary containment, a 100-gallon premium gasoline AST and three 55-gallon drums with premium gasoline within two clamshell containments. Any additional fuel will be stored in sealed 55-gallon steel drums, approved double-walled fuel tanks, or in approved single-walled tanks within secondary containment. Fuel will be managed, tanks would be inspected, and any oil release would be responded to in accordance with the SPCC plan.

The shop building houses two small, double-walled, used-oil ASTs. The used oil is burned in the building furnace to provide heat. In addition, Jet A fuel (5,000 gallons) and diesel (2,500 gallons) is stored in double walled tanks within tertiary containment adjacent to the helicopter hangar.

If any event occurs during performance of the ASAOC activities that causes or threatens to cause a release of fuel on, at, or from the Site that either constitutes an emergency situation or that may present an immediate threat to public health or welfare or the environment, all appropriate actions will be immediately taken to prevent, abate, or minimize such release or threat of release. These actions will be taken in accordance with the applicable provisions of the ASAOC, including, but not limited to, the Health and Safety Plan (EPA and USFS 2021). Specific requirements for spill prevention, control, and response as they relate to pollution control are summarized in Table 6-1.

Table 6-1 Environmental Protection Practices for Fuel Handling and Spill Prevention[1]

A. Minimize Potential Pollutant Discharge
1. A copy of the SPCC plan will be kept at an appropriate onsite facility. Staff handling fuel or petroleum products will be trained to successfully implement the SPCC plan.
2. Vehicles and equipment will be inspected daily for fluid leaks before leaving construction staging and material storage areas.
3. Fuel will be properly stored, labeled, and inventoried.
4. Secondary containment, spill kits, or other equivalent measures will be used for fueling operations.
5. Fueling sources and facilities will be located away from surface waters and drainageways.
6. Fuel, equipment, and fueling activities will be located so that potential leaks and spills are able to be contained or diverted before discharge.
7. All spills will be cleaned up, documented, or reported immediately as appropriate.
8. Used oil and oily material recovered from spill cleanup operations will be disposed of in a manner approved by IDEQ, and in compliance with applicable EPA regulations.
9. Pumps used adjacent to water shall use spill containment systems.
10. Safety Data Sheets (SDS) for all products will be posted and available on site.
11. All fuel containers will be marked with contents, owner's name, and contact information.
B. Equipment Staging and Material Storage
1. Transport of equipment is generally done before mid-March or after June when road conditions allow. As needed, end of season equipment mobilization will take place in late November or early December.

2.	Equipment will be stored at the site laydown yards and adjacent to the core shack on private property whenever possible. Some equipment is already on site from previously permitted exploration activities.
3.	Equipment will be maintained in good condition and inspected regularly for leaks and damage.
4.	All equipment brought on-site will be in proper operating order, used in the manner it is designed for, and maintained as such.
5.	Equipment will be cleaned of dirt and mud prior to demobilization or transport on public paved roadways.
6.	Vehicle and equipment cleaning, maintenance, refueling, and fuel storage will be conducted at least 150 feet away from any natural water body.
7.	Materials will be stored in accordance with the manufacturer's instructions when applicable. Regular inspection of material storage areas will be conducted for signs of liquid leakage, or tears in protective packaging for other stored materials.
8.	All storage and staging areas will be kept clean and free of accumulated waste.
C.	**Primary Fuel Storage Area and Fueling**
1.	All petroleum products will be transported in accordance with state and federal Department of Transportation (DOT) regulations and handled and stored as per applicable state and federal petroleum product storage and handling laws and regulations.
2.	Fuel will be stored in identified storage areas, in sealed 55-gallon steel drums, approved double-walled fuel tanks, or in approved single-walled tanks within secondary containment.
3.	Fuel delivery vehicles will drive completely into containment areas, and all refueling operations will be completed therein.
4.	No sources of flame or potential sparks will be in the vicinity when fueling.
5.	Hoses will be maintained in a position to prevent spillage.
6.	All hoses and the delivery trucks will be inspected regularly.
7.	A detailed log of fueling activities will be kept up to date.
8.	Fuel containment sites, engines and other equipment with fuel or lubricants will be periodically checked for leakage or spillage and in accordance with the SPCC plan
9.	All bulk fuel storage will be placed outside of the floodplain and high-water mark of surface waters.
10.	A standard spill prevention kit, and fire kit will be stored at the re-fueling site and would be readily available during off-loading of fuel from the fuel truck or during refueling operations.
11.	Regular inspections will be performed for all hazardous material and fuel storage areas.
D.	**Spill Response**
1.	All fuel transport drivers will be required to have spill response, safety, and resource awareness training.
2.	The operator will immediately report any fuel, oil, or chemical discharges or spills greater than 25 gallons on land, or any spill directly in a stream as required by applicable federal and state regulations.
3.	In the event of a spill, all personnel will be accounted for to ensure their safety.
4.	Appropriate cleanup with be initiated immediately according to the parameters in the SPCC and other authorities.
5.	Two or more stored spill containment/response caches will be placed along the fuel delivery route.
6.	Report all spills as required to appropriate authorities.

[1]Derived primarily from *Stibnite Gold Exploration Project, Spill Prevention, Control, and Countermeasures Plan*, (Perpetua 2019).

7. STOCKPILES AND BORROW SOURCES

Material stockpiles and borrow sources will be required for the removal actions to support project objectives and reclamation of work areas. Stockpiling will be utilized to preserve native topsoil and vegetation wherever possible, and additional construction material stockpiles will be created as borrow materials are sorted (screened) to segregate various silt/sand, gravel, cobble, and boulder fractions for later use. General BMPs for borrow sources and stockpiles are summarized in Table 7-1. Perpetua has developed a Borrow Source Development Plan for the ASAOC actions. The primary objective of this borrow source investigation is to find suitable material that meets geotechnical specifications and agreed upon chemical concentration criteria for use. Perpetua has identified four proposed borrow sources that likely do not contain mineralization. It is estimated Perpetua will require approximately 50,000 cubic yards of borrow material for the Phase 1 removal actions.

Table 7-1 Environmental Protection Practices for Borrow Sources and Stockpiles

A. Stockpiles	
1.	Keep stockpiled soil and vegetative material that is to be reused clean by clearly isolating from other potential contaminant sources.
2.	Direct surface water away from stockpiles to prevent erosion or deterioration of materials.
3.	Maintain dust control on stockpiles as necessary.
4.	Prevent weeds from establishing on stockpiles. Treat weed occurrences on and near stockpiles as appropriate.
5.	BMPs (straw wattles, etc.) will be placed around stockpiles to prevent sediment transport during storm events. If soil stockpiles will be stored for more than one season they will be seeded or mulched to prevent weed encroachment.
B. Borrow Sources	
1.	Work will be performed in designated borrow areas only. Land disturbance will be minimized to the greatest extent possible. Vegetation located outside of the construction limits will not be disturbed.
2.	Topsoil and any brush removed will be stockpiled separate from the excavated material and used in site reclamation. Tree removal will be kept to the minimum amount necessary for safe access and operation. Cut trees and root wads will be retained on site for reclamation.
3.	Standard reclamation practices will be followed, including segregating and stockpiling topsoil, implementing stormwater and sediment BMPs, backfilling and placing topsoil, and revegetation. Any areas leveled for test pits or temporary access will be re-contoured and re-seeded.
4.	Borrow areas will be managed to prevent and/or limit sediment from entering surface water or land adjacent to the site.
5.	Earthwork will be executed in a manner to minimize the exposure and duration of exposure of unprotected soils.
6.	Protect side slopes and backslopes as soon as rough grading is completed by diverting surface runoff and/or establishing runoff drop structures and channels, to prevent erosion of said slopes.
7.	All excavations will be free of overhangs, and the sidewalls will be kept free of loose material.

8. RESTORATION AND REVEGETATION

All disturbed areas and borrow sources will be restored and revegetated as soon as practicable following construction. Standard restoration and revegetation practices will be followed, including segregating and stockpiling topsoil, implementing stormwater and sediment BMPs, backfilling and placing topsoil, and revegetating. Table 8-1 summarizes environmental protection practices for restoration and revegetation.

Table 8-1 Environmental Protection Practices for Restoration and Revegetation

1.	Initiate vegetative stabilization as soon as conditions allow. Establish a goal of 70% cover within three years of planting.
2.	Reclamation seeding will be done with native seed mixtures appropriate for the elevation and habitat. Prior to installation, types, locations, and amounts of seed will be approved by the Forest Service.
3.	Topsoil and any brush removed will be stockpiled separate from fill material and used in reclamation.
4.	For any borrow source, standard reclamation practices will be followed, including segregating and stockpiling topsoil, implementing stormwater and sediment BMPs, backfilling and placing topsoil, and revegetation.
5.	To minimize the risk of noxious weed infestations or spread of weed seeds, equipment will be inspected and cleaned prior to mobilizing onto the Payette National Forest or Project Area.
6.	All access routes shall be restored to their original condition and prepped for seeding by scarifying the surface at the end of construction.
7.	Project areas will be inspected prior to project-related activities and treated if they are found to be weed-infested. Herbicide use, where prescribed, will be in accordance with the *South Fork Salmon River Sub Basin Noxious and Invasive Weed Management Program* (USFS 2007).
8.	Only certified weed free straw, wattles or bales will be used on site.
9.	Soil stockpiles will be kept in a clean and orderly manner. Water may be used during dry periods to prevent soil loss to dust. Seeding or mulching may be necessary to prevent weeds. Perimeter sediment controls may need to be installed.

9. WILDLAND FIRE PREVENTION

The Site is located in a wildland fire prone area. As such, care and diligence will be taken during dry conditions and the traditionally recognized wildland fire season. Table 9-1 summarizes Environmental Protection Practices to prevent wildland fire resulting from project activities and reduce wildland fire risk from an outside source.

Table 9-1 Environmental Protection Practices to Prevent Wildland Fire

1.	Equipment that could potentially come into contact with dry vegetation will be required to have functional spark arrestors.
2.	Fire suppression equipment will be kept at each work site and in vehicles as appropriate. This includes shovels, axes, buckets, and fire extinguishers.
3.	All activities will be conducted in accordance with State of Idaho fire protection procedures (as outlined in IDAPA 20.04.01), local Valley County Fire District regulations, and Forest Service rules and regulations and 36 CFR 228.11.
4.	Several fire-response kits will be spaced strategically around the project area in case of fire.
5.	On-site staff will monitor local and on-site fire conditions and maintain contact with local area fire officials to ensure appropriate fire management procedures are followed in the event of implementation of fire restrictions or woodland use restrictions (e.g., “Red Flag Warnings”).
6.	Any fire occurrence will be reported immediately to the local fire management units.
7.	The Site will be kept clean and clear of debris.

10. FISHERIES AND AQUATIC RESOURCES

Four federally listed or Forest Service sensitive fish species and their critical habitats are associated with the Stibnite area: Chinook salmon (*Oncorhynchus tshawytscha*), steelhead trout (*Oncorhynchus mykiss*), bull trout (*Salvelinus confluentus*), and westslope cutthroat trout (*Oncorhynchus clarkii lewisi*). Chinook salmon, steelhead, and bull trout are federally listed as threatened under the Endangered Species Act (ESA), and westslope cutthroat trout is a Forest Service sensitive species. All actions conducted under this ASAOC have incorporated resource protections and management considerations specific to current regulatory guidance, species specific design criteria, and proven BMPs for fisheries resources to preclude impacts to fisheries and aquatic species and habitat. This includes the following guidance:

- Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Payette National Forest, December 2020.
- National Marine Fisheries Service (NMFS), 2019. Re-initiation of the Endangered Species Act Section 7(a)(2) Programmatic Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation Habitat Restoration Projects in the Salmon River Basin (HUC 170602), Clearwater River Basin (HUC 170603), Hells Canyon Subbasin (HUC 17060101), and Lower Snake-Asotin Subbasin (HUC 17060103), Idaho NMFS Consultation Number: WCR-2018-9898.
- Formal Section 7 programmatic consultation on Bonneville Power Association’s (BPAs) Columbia River Basin Habitat Improvement Program, 2014.
- Stibnite Gold Project Stream Design Report (Rio ASE, 2021).
- U.S. Bureau of Reclamation’s Large Woody Materials Risked-Based Design Guidelines, September 2014.

During the TCRA removal actions, resource protections will be established, prior to the onset of disturbance, to protect aquatic habitat and minimize sediment introduction during instream work and work adjacent to streams. Work in these areas will be conducted during dry conditions (summer and fall season), utilize structural controls, include turbidity monitoring for adaptive project management, and incorporate native plants in reclamation plans. Fisheries and other aquatic resource protection measures are listed in Table 10-1.

Table 10-1 Environmental Protection Practices to Protect Fisheries and Aquatic Resources

A.	**Fisheries and Aquatic Resources**
1.	Environmental protection practices outlined in applicable programmatic or project-specific biological assessments for fisheries and aquatic resources will be incorporated into all phases of ASAOC action implementation, as appropriate.
2.	Work requiring equipment to operate partly or wholly below the ordinary high-water line will be completed during the approved in-water work window. Equipment must be thoroughly cleaned before entering the water.
3.	In fish-bearing waters, intake hoses will be screened with the most appropriate mesh size (generally 3/32 of an inch), or as determined through coordination with NOAA Fisheries and/or USFWS. Water supply points, service areas, and other needs for road and facility construction projects are to be identified before implementation to avoid impacts to, soil, water and riparian resources and occupied special status plant habitat.
4.	Fish passage will be provided at all proposed and reconstructed stream crossings of existing and potential fish-bearing streams.
5.	Potential water sources will be surveyed by Perpetua in coordination with the Forest Service for Columbia spotted frog egg masses and other amphibians after ice melt and avoid disturbing any water sources with identified egg masses or other species. Exceptions: If egg masses are found at a water source essential for project activities, the egg masses would be relocated in coordination with the USFS.
6.	Any work area within the wetted channel will be isolated from the active stream whenever ESA-listed fish are reasonably certain to be present, or if the work area is less than 300 feet upstream from known spawning habitats.
7.	Work area isolation and fish salvage activities will comply with the in-water work window.
8.	Work area isolation and fish capture activities will occur during periods of the coolest air and water temperatures possible, normally early in the morning versus late in the day, and during conditions appropriate to minimize stress and death of species present.
9.	Plume or turbidity monitoring may be required both upstream and downstream of instream work.

11. CULTURAL RESOURCES

Archaeological surveys have been completed in the general project area to support SGP NEPA permitting activities. Upon completion of work plans and 30% designs for the removal action, Perpetua or the USFS On-Scene Coordinator (OSC) will coordinate with the USFS archaeologist or heritage program manager to determine if existing NEPA cultural survey coverage adequately covers the TCRA work area, and if cultural resources have been identified within 200 feet of TCRA work areas or access roads. If existing coverage is determined to be inadequate, USFS and/or Perpetua will arrange for additional on-the-ground archaeological surveys to be completed prior to initiation of construction or ground disturbing activities.

If previously undiscovered cultural resources (historic or prehistoric objects, artifacts, or sites) are encountered or exposed as a result of construction operations, operations will immediately cease within 100 feet of the discovery to secure the location. The agency OSCs will be notified, and operations would not proceed in that area until approval is received from USFS archaeologist and/or agency OSC.

These provisions shall not apply to mining-related historical infrastructure and mining-related discarded materials likely to be present in the work areas, including historical building foundations, tailings dams, bottles, cement pads, plumbing pipes, track, rails, electrical wiring, barrels, shingles, bedframes, papers, old shoes, and other 20th century historical materials.

12. OTHER RESOURCE SPECIFIC PROTECTION PRACTICES

Recent permitting and design for the larger Stibnite Gold Project proposed by Perpetua has resulted in an increased understanding of baseline and existing condition for natural resources associated with the Site. Standards and guidelines in the Payette National Forest Land Resource Management Plans (RMP; USFS 2010) that are designed to reduce or prevent undesirable impacts resulting from proposed management activities are incorporated into all ASAOC

actions. Many of the Environmental Protection Practices presented in previous sections are intended to limit or mitigate impacts to multiple resources. Resource specific mitigations and design features are emphasized in individual Work Plans and tailored to the individual project location, engineering design, surface water features, and site-specific conditions.

The Statement of Work (SOW) for the ASAOC requires that a biological assessment be completed that characterizes baseline conditions of existing habitat in and around Time Critical Response Action (TCRA) areas; addresses potential project impacts that the projects may have on threatened or endangered species, their habitat, and their food stocks; and describes best management practices and conservation measures designed to avoid or minimize any negative impacts. The SOW further requires that a Clean Water Act Section 404 analysis memorandum be prepared, if the recommended removal action alternatives will impact jurisdictional wetlands. The memorandum shall document the information gathered regarding practicability and cost, long and short-term effects from all proposed alternatives, minimization of adverse effects, and an analysis of the need for any mitigation. Environmental protection practices outlined in the project specific biological assessment and wetland memorandum are incorporated into all phases of ASAOC action implementation.

Table 12-1 lists overarching resource specific environmental protection practices and incorporates best management practices and mitigation features by reference.

Table 12-1 Other Resource Specific Environmental Protection Practices

A. Wildlife	
1.	Environmental protection practices outlined in the project specific biological assessment for terrestrial species will be incorporated into all phases of ASAOC action implementation, as appropriate.
2.	The appropriate state and federal wildlife managers will be notified of occupied Endangered Species Act or sensitive species nests, dens or critical habitat encountered during project implementation. Sightings of listed or sensitive wildlife species will be reported to the USFS.
3.	Any adverse wildlife encounters will be reported to the appropriate state and federal wildlife managers.
4.	Calving and fawning areas will be protected from project-related disturbance during big game calving or fawning season.
5.	To prevent inadvertent entrapment of common and special-status wildlife during construction, all excavated, steep-walled holes or trenches more than two feet deep will be covered with tarp, plywood, or similar materials at the close of each working day to prevent animals from being trapped.
6.	Boreal and great gray owl and northern goshawk sightings or nests will be reported to the USFS for appropriate follow up.
B. Wetlands and Riparian Areas	
1.	Environmental protection practices outlined in the project specific wetland memorandum will be incorporated into all phases of ASAOC action implementation, as appropriate.
2.	Wetland and stream reclamation areas with be restored with native plant species as appropriate.
3.	Existing access routes will be preferentially used whenever reasonable, and the number and length of temporary access roads and paths through riparian areas, wetlands and floodplains will be minimized.
4.	Wetlands and riparian areas outside of the work limits will be protected wherever access roads traverse through these features and will be restored to their original grade and condition. Protection measures will include stripping and stockpiling wetland vegetation for subsequent reclamation, protective mats, and wood chips or quarry spalls underlain with geotextile fabric will be installed. All protective materials will be removed at project completion.
5.	The removal of riparian vegetation during construction of temporary access roads will be minimized. When temporary vegetation removal is required, vegetation will be cut at ground level (not grubbed).
C. Weeds and Invasive Species	
1.	Project areas will be inspected for noxious and invasive species prior to the onset of the project. Weeds will be avoided or treated as appropriate. Equipment will be inspected prior to entering the project area.
2.	Project areas will be inspected for special status species plants prior to the onset of the project. Any protected plants encountered will be reported to the USFS and consideration will be given to preserve or move these individuals.
3.	Seeds and plants used for seedings and plantings in revegetation projects will originate from genetically local sources of native species.

4. When feasible, growth media and seedbank materials from wetlands and riparian disturbance areas will be salvaged and stockpiled for subsequent restoration.
5. Borrow sites will be inspected for weeds prior to use.
6. Contractors will be required to pressure wash and remove all dirt, grease, oil, fuel, vegetation and weed seeds before bringing equipment on site to limit introduction of noxious weeds, aquatic invasive species, and pollutants to the site.
7. Watercraft, waders, boots, and any other gear to be used in or near water will be inspected for aquatic invasive species. Wading boots with felt soles are not to be used due to their propensity for aiding in the transfer of invasive species unless approved decontamination procedures have been used.
D. Soil
1. For borrow sources and all areas of temporary disturbance, standard reclamation practices will be followed, including segregating and stockpiling topsoil, implementing stormwater and sediment BMPs, backfilling and placing topsoil, and revegetating.
2. To minimize material loss and sediment runoff from the temporary roads and roadbeds, water bars, silt fencing, certified weed-free wattles, and/or weed-free straw bales will be installed in strategic downslope areas and in Riparian Conservation Areas (RCAs).
E. Air Quality
1. When practicable, pumps, generators, and engines will be turned off when not in use to avoid unnecessary noise generation and reduce energy consumption and emissions.
F. Night Sky and Noise
1. Work will be conducted during daylight hours whenever possible.
2. Whisper Quiet light plants with light shields will be used to mitigate visual impacts from night necessary operations.
3. Buildings and equipment and drill rigs will have limited external lighting and will employ noise-minimizing practices. Light shields will be placed over outside lights, confining light to the immediate area in order to further limit visual impacts.

13. SITE SPECIFIC PROTECTIONS – STREAM DIVERSIONS

Table 13-1 Site Specific Protection Measure Summary - Stream Diversions

A. General Consideration
1. All permanent diversions will be constructed to accommodate the 100-year flood event.
2. Any material not used in restoration, and not native to the floodplain, will be disposed of outside the floodplain.
3. Any large wood, topsoil, and native channel material displaced by construction will be stockpiled for use during site restoration at a specifically identified and flagged area.
4. Natural materials used for implementation of aquatic restoration, such as large wood, gravel, and boulders, may be staged within 150 feet of watercourses if clearly indicated in the plans that area is for natural materials only.
5. If there is a potential for eroded sediment to enter the stream, sediment barriers will be installed and maintained for the duration of project implementation.
B. Temporary Access Roads
1. All temporary access roads will be depicted in the design package. The Contractor may not deviate from these locations without prior approval.
2. Establish access road for access from public roads to the work area of a width and load-bearing capacity to provide unimpeded traffic for construction purposes.
C. Work Area Isolation and Cofferdams
1. The Contractor shall place temporary cofferdams between the actively flowing river surface water and all active work areas. The Contractor may place temporary cofferdams at additional locations to achieve required water quality standards, or simplify construction as determined by the Contractor.
2. Fill material for bulk bags or “super sacks”, if used, shall be clean, washed, and rounded material similar in gradation to the existing channel substrate, and not contain fines. Material must be approved before use.
3. Cofferdams and diversion dams must be built in a manner to meet turbidity limits as defined in the project Specifications. Use of gravel and soil to build a pushup type cofferdam or flow diversion dam are acceptable at locations not connected to surface water flow but will not be allowed in the actively flowing channel.
D. Dewatering and Pumping

1.	Dewatering will occur at a rate slow enough to allow species to naturally migrate out of the work area.
2.	Where a gravity feed diversion is not possible, a pump may be used. Pumps will be installed and operated to avoid repetitive dewatering and rewatering.
3.	When fish are present, pumps will be screened in accordance with NMFS fish screen criteria.
4.	Dissipation of flow energy at the bypass outflow will be provided to prevent damage to the stream channel and riparian vegetation.
5.	Seepage water will be pumped to a temporary storage and treatment site or into upland areas to allow water to percolate through soil and vegetation prior to reentering the stream channel.
E. Staged Rewatering Plan	
1.	When reintroducing water to dewatered areas and newly constructed channels, a staged rewatering plan will be applied. The following will be applied to all rewatering efforts. Complex rewatering efforts may require additional notes or a dedicated sheet in the construction details. • Turbidity monitoring protocol will be applied to rewatering efforts. • Pre-wash the area before rewatering. Turbid wash water will be detained and pumped to the floodplain or sediment capture areas rather than discharging to fish-bearing streams. • Install seine nets at upstream end to prevent fish from moving downstream until 2/3 of total flow is restored to the channel. • Starting in early morning introduce 1/3 of new channel flow over period of 1 to 2 hours. • Introduce second third of flow over next 1 to 2 hours and begin fish salvage of bypass channel if fish are present. • Remove upstream seine nets once 2/3 flow in rewatered channel and downstream turbidity is within acceptable range (less than 40 NTU or less than 10% background). • Introduce final third of flow once fish salvage efforts are complete and downstream turbidity verified to be within acceptable range. • Install plug to block flow into old channel or bypass. Remove any remaining seine nets.
F. Turbidity Monitoring	
1.	Record the reading, location, and time for the background reading approximately 100 feet upstream of the project area using a recently calibrated turbidimeter or via visual observation.
2.	Record the turbidity reading, location, and time at the measurement compliance location point. • 50 feet downstream for streams less than 30 feet wide. • 100 feet downstream for streams between 30 and 100 feet wide. • 200 feet downstream for streams greater than 100 feet wide.
3.	Turbidity will be measured (background location and compliance points) every 4 hours while work is being implemented.
4.	If exceedances occur for more than two consecutive monitoring intervals (after 8 hours), the activity will stop until the turbidity level returns to background. The OSCs will be notified of all exceedances and corrective actions at project completion.
5.	If turbidity controls (coffer dams, wattles, fencing, etc.) are determined ineffective, crews will be mobilized to modify, as necessary. Occurrences will be documented in the project daily reports.

14. SITE SPECIFIC PROTECTIONS – BRADLEY MAN CAMPS

Table 14-1 Site Specific Protection Measure Summary - Bradley Man Camps Removal

A. Repository BMPs	
1.	The tailings and waste rock will be placed in lifts, with the lift height sufficient to achieve design compaction. Maximum lift height specifications are set based on maximum anticipated particle size in the fill. Max lift heights for soils with cobbles is typically twice the maximum particle size (lift height = 2 * max particle size). As the waste dumps are likely to contain

material exceeding 18", larger lift heights are likely warranted. One foot lift height may be appropriate for tailings depending on compaction specifications.
2. After material placement, spreading, and leveling to the appropriate lift thickness, tailings and waste rock will be uniformly compacted.
3. Work will be executed in a manner to minimize the exposure and duration of exposure unprotected waste rock or tailings.
4. A waste placement plan will be developed in the design and construction planning phases once final time critical removal actions are selected, as it must coordinate activities between multiple removal projects. Perpetua proposes to take advantage of atmospheric drying during the hot and dry construction period on site and has included additional methodologies to enhance drying in the description of the removal action. The field investigation will collect data to assess the effectiveness of these proposals.
5. Maximum final side slopes will not exceed 3H:1V
6. Minimum final slope will be 3% to minimize ponding potential.
7. Standard stormwater management, sediment control, and dust control BMPs will apply to repository construction.
8. The repository cover will be graded to drain and minimize ponding to reduce infiltration.
9. Traffic associated with the repository will yield on public roadways. Flaggers, signage and barricades will be used at the site entrance as necessary for safety.
10. Water sprinkling will be conducted as needed to control dust.
B. Haul Traffic
1. Caution signs and directional signs will be installed during hauling operations. Night operations, if required, will include lighting as necessary.
2. The haul route will be inspected and maintained regularly for surface integrity, erosion and sediment control and dust suppression.
C. Stream Protection Adjacent to Work Area
1. Roll out protection will be applied in work areas immediately adjacent to the East Fork South Fork Salmon River.
2. Equipment will not be allowed to enter the water column.
D. Dewatering and Pumping
1. Dewatering will utilize land application within the existing work phases as necessary.
2. Wet material will be staged within the work area for drying prior to being hauled to the Repository.

15. SITE SPECIFIC PROTECTIONS – TAILINGS REMOVAL

Table 15-1 Site Specific Protection Measure Summary – Tailings Removal

A. Temporary Access Roads
1. All temporary access roads will be depicted in the design package. The Contractor may not deviate from these locations without prior approval.
2. Establish access road for access from public roads to the work area of a width and load-bearing capacity to provide unimpeded traffic for construction purposes.
B. Work Area Isolation and Cofferdams
3. The Contractor shall place temporary cofferdams between the actively flowing river surface water and all active work areas. The Contractor may place temporary cofferdams at additional locations to achieve required water quality standards, or simplify construction as determined by the Contractor.

4. Fill material for bulk bags or "super sacks", if used, shall be clean, washed, and rounded material similar in gradation to the existing channel substrate, and not contain fines. Material must be approved by the Contracting Officer and clearly defined in the Cofferdam and Flow Diversion Plan submittal.
5. Cofferdams and diversion dams must be built in a manner to meet turbidity limits as defined in the project Specifications. Use of gravel and soil to build a pushup type cofferdam or flow diversion dam are acceptable at locations not connected to surface water flow but will not be allowed in the actively flowing channel.

C. Fish Salvage

1. Fish salvage activities is expected to be completed by project partners (IDFG or third-party) and will not be the responsibility of the Contractor.
2. Monitoring and recording will take place for duration of salvage.
3. Salvage activities should take place during conditions to minimize stress to fish species, typically periods of the coolest air and water temperatures which occur in the morning versus late in the day.
4. Salvage operations will follow the ordering, methodologies, and conservation measures specified below:
    - Slowly reduce water from the work area to allow some fish to leave volitionally.
    - Block nets will be installed at upstream and downstream locations and maintained in a secured position to exclude fish from entering the project area.
    - Block nets will be secured to the stream channel bed and banks until fish capture and transport activities are complete. Block nets may be left in place for the duration of the project to exclude fish if passage requirements are met.
    - Nets will be monitored hourly during in-stream disturbance.
    - If block nets remain in place more than one day, the nets will be monitored at least daily to ensure they are secured and free of organic accumulation. If bull trout are present, nets are to be checked every 4 hours for fish impingement.
    - Capture fish through seining and relocate to streams.
    - While dewatering, any remaining fish will be collected by hand or dip nets.
    - Seines with a mesh size to ensure capture of the residing ESA-listed fish will be used.
    - Minnow traps will be left in place overnight and used in conjunction with seining.
    - Electrofish to capture and relocate fish not caught during seining per electrofishing conservation measures.
    - Continue to slowly dewater stream reach.
    - Collect any remaining fish in cold-water buckets and relocate to the stream.
    - Limit the time fish are in a transport bucket.
    - Minimize predation by transporting comparable sizes of fish in buckets.
    - Bucket water to be changed every 15 minutes or aerated.
    - Buckets will be kept in shaded areas or covered.
    - Dead fish will not be stored in transport buckets but will be left on the stream bank to avoid mortality counting errors.

5. Salvage guidelines for bull trout, mussels (possible but not anticipated), and other native fish are as follows.
   - Conduct site survey to estimate salvage numbers.
   - Pre-select site(s) for release and/or mussel bed relocation.
   - Salvage of bull trout will not take place when water temperatures exceed 15 degrees Celsius.
   - If drawdown lasts less than 48 hours, salvage of mussels may not be necessary if temperatures support survival in sediments.
   - Salvage mussels by hand, locating by snorkeling or wading.
   - Salvage bony fish with nets or electrofishing.
   - Regularly inspect dewatered site in case mussels may become visible.
   - Mussels may be transferred in coolers.
   - Mussels will be placed individually to ensure ability to burrow into new habitat.

D. Dewatering and Pumping

1. Dewatering will occur at a rate slow enough to allow species to naturally migrate out of the work area.
2. Where a gravity feed diversion is not possible, a pump may be used. Pumps will be installed and operated to avoid repetitive dewatering and rewatering.
3. When fish are present, pumps will be screened in accordance with NMFS fish screen criteria.
4. Dissipation of flow energy at the bypass outflow will be provided to prevent damage to the stream channel and riparian vegetation.
5. Seepage water will be pumped to a temporary storage and treatment site or into upland areas to allow water to percolate through soil and vegetation prior to reentering the stream channel.

E. Staged Rewatering Plan

1. When reintroducing water to dewatered areas and newly constructed channels, a staged rewatering plan will be applied. The following will be applied to all rewatering efforts. Complex rewatering efforts may require additional notes or a dedicated sheet in the construction details.
   - Turbidity monitoring protocol will be applied to rewatering efforts.
   - Pre-wash the area before rewatering. Turbid wash water will be detained and pumped to the floodplain or sediment capture areas rather than discharging to fish-bearing streams.
   - Install seine nets at upstream end to prevent fish from moving downstream until 2/3 of total flow is restored to the channel.
   - Starting in early morning introduce 1/3 of new channel flow over period of 1 to 2 hours.
   - Introduce second third of flow over next 1 to 2 hours and begin fish salvage of bypass channel if fish are present.
   - Remove upstream seine nets once 2/3 of flow is in rewatered channel and downstream turbidity is within acceptable range (less than 40 NTU or less than 10% background).
   - Introduce final third of flow once fish salvage efforts are complete and downstream turbidity verified to be within acceptable range.
   - Install plug to block flow into old channel or bypass. Remove any remaining seine nets.

F. Turbidity Monitoring

1. Record the reading, location, and time for the background reading approximately 100 feet upstream of the project area using a recently calibrated turbidimeter or via visual observation.

2.	Record the turbidity reading, location, and time at the measurement compliance location point. • 50 feet downstream for streams less than 30 feet wide. • 100 feet downstream for streams between 30 and 100 feet wide. • 200 feet downstream for streams greater than 100 feet wide.
3.	Turbidity will be measured (background location and compliance points) every 4 hours while work is being implemented.
4.	If there is a visible difference between a compliance point and the background, the exceedance will be noted in the project completion form (PCF). Adjustments or corrective measures will be taken to reduce turbidity.
5.	If turbidity controls (coffer dams, waddles, fencing, etc.) are determined ineffective, crews will be mobilized to modify, as necessary. Occurrences will be documented in the project construction report.

16. ENVIRONMENTAL STANDARD OPERATING PROCEDURES

Perpetua has developed a series of environmental standard operating procedures (ESOPs) and associated plans that apply to operations at the Site. Copies of the following ESOPs and plans will be retained on site for the duration of the project:

ESOP-001	Spill Response
ESOP-003	Equipment Fueling
ESOP-004	Fuel Transportation
ESOP-013	Waste Management
ESOP-022	Hach Turbidity Meter Use and Calibration
ESOP-023	Weed Management
ESOP-024	Herbicide Spill Response
ESOP-028	Spill Prevention, Control, and Countermeasure Plan (SPCC Plan)
ESOP-029	Stormwater Pollution Prevention Plan (SWPPP)
ESOP-034	Fueling Vehicle and Portable Containers

17. TRAINING

Employee and contractor training are an important part of the Environmental Protection Program. Pre-project briefings and tailgate sessions will be conducted to ensure that personnel and operators are aware of environmental standards and concerns during all phases of the ASAOC action. A log will be kept of all training sessions.

18. DOCUMENTATION

Perpetua has developed an environmental monitoring and documentation system that will support the ASAOC actions and ensure environmental protections are in place and current. All environmental protection records will be retained by Perpetua and available upon request.

19. REFERENCES

Bonneville Power Administration (BPA), 2014. Habitat Improvement Program Handbook. Abbreviated Guidance of General and Specific Conservation Measures, Biological Opinion Requirements and RRT Guidance.

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National Marine Fisheries Service (NMFS), 2019. Re-initiation of the Endangered Species Act Section 7(a)(2) Programmatic Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation Habitat Restoration Projects in the Salmon River Basin (HUC 170602), Clearwater River Basin (HUC 170603), Hells Canyon Subbasin (HUC 17060101), and Lower Snake-Asotin Subbasin (HUC 17060103), Idaho NMFS Consultation Number: WCR-2018-9898. noaa_20696_DS1.pdf

National Marine Fisheries Service (NMFS), 2020. Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Payette National Forest, December 2020.

Perpetua Resources Incorporated, 2019. Stormwater Pollution Prevention Plan (SWPPP). Stibnite Gold Exploration Project, January 2019.

Perpetua Resources Incorporated, 2021. Spill Prevention, Control and Countermeasure Plan (SPCC). Stibnite Gold Exploration Project. February 2019.

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U.S. Bureau of Reclamation (USBR), 2014. Pacific Northwest Region Resource & Technical Services Large Woody Material - Risk Based Design Guidelines. September 2014. Extracted 30 March 2021 https://www.usbr.gov/pn/fcrps/documents/lwm.pdf.

U.S. Environmental Protection Agency and U.S. Department of Agriculture Forest Service (EPA and USFS), 2021. Administrative Settlement Agreement and Order on Consent for Removal Actions, Stibnite Mine Site. CERCLA Docket No. 10-2021-0034.

U.S. Fish and Wildlife Service (USFWS), 2013. Formal section 7 programmatic consultation on BPA's Columbia River Basin Habitat Improvement Program. Oregon Fish and Wildlife Office, Portland, Oregon.

U.S. Forest Service (USFS), 2003. Final Forest Plan Revision Payette National Forest. July 2003.

U.S. Forest Service (USFS), 2007. South Fork Salmon River Sub Basin Noxious and Invasive Weed Management Program.

U.S. Forest Service (USFS), 2010. Payette National Forest Land Resource Management Plan.

Valley County, 2020. Road Maintenance Agreement for Yellow Pine to Stibnite Road. Cascade, Idaho.

Appendix A:
Valley County Road Maintenance Agreement

Stibnite Mine Site

Stibnite, Valley County, ID

Prepared for:

U.S. Environmental Protection Agency Region 10

United States Department of Agriculture Forest Service Intermountain Region

Prepared by:

Perpetua Resources

405 S 8th St,
Boise, ID, 83702

July 2021

Appendix B:

Catalog of Stormwater Best Management Practices

For Idaho Cities and Counties

Stibnite Mine Site

Stibnite, Valley County, ID

Prepared for:

U.S. Environmental Protection Agency Region 10

United States Department of Agriculture Forest Service Intermountain Region

Prepared by:

Perpetua Resources

405 S 8th St,
Boise, ID, 83702

July 2021

Appendix C:
Spill Prevention Control and Countermeasures Plan
(SPCC)

Stibnite Mine Site

Stibnite, Valley County, ID

Prepared for:

U.S. Environmental Protection Agency Region 10

United States Department of Agriculture Forest Service Intermountain Region

Prepared by:

Perpetua Resources

405 S 8th St,
Boise, ID, 83702

July 2021

Appendix D:

Comment Response Table

For Idaho Cities and Counties

Stibnite Mine Site

Stibnite, Valley County, ID

Prepared for:

U.S. Environmental Protection Agency Region 10

United States Department of Agriculture Forest Service Intermountain Region

Prepared by:

Perpetua Resources

405 S 8th St,
Boise, ID, 83702

July 2021